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Cover Photographs: Ralph W. Beeson University Center with Davis Library in background on the campus of Samford University, Birmingham, Alabama, site of the 77th Annual meeting of the Alabama Academy of Science.

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Journal of the Alabama Academy of Science, Vol. 71, No. 1-2, January/April, 2000.

ABSTRACTS

Papers presented at the 77th Annual Meeting
Samford University
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BIOLOGICAL SCIENCES

AN EVALUATION OF LEKKING IN FIDDLER CRABS (*Uca spp.*).

George A. Croll and James B. McClintock, Biology Department, University of Alabama at Birmingham, Birmingham, AL 35294.

The reproductive behavior of *Uca* has been extensively studied, especially the connections between the dimorphically enlarged male claw, female selection and reproductive success. Sometimes *Uca* males appear to aggregate in defined areas for the purpose of attracting a mate. In avian and mammalian species, these aggregations would be termed leks. The purpose of this study was to examine the lek-like breeding assemblages that occur in marsh habitats lacking vegetative cover. Three factors were considered: population dynamics, reproductive behavior, and substratum organic content. Four North American marshes were sampled; two on the Atlantic Coast, one on the Chesapeake Bay and one on the Gulf Coast. Males were significantly more common and more adults were found in marsh areas lacking vegetative cover. Moreover, individuals occupying open marsh areas spent significantly more time eliciting reproductive behaviors such as cheliped waving. Substratum organic contents (a measure of available food resources) in open areas lacking vegetative cover were equal to or less than organic contents in vegetatively covered areas indicating aggregative behaviors in open areas were not food induced. These factors suggest that lek behavior is an integral component of the reproductive repertoire of selected *Uca spp.*

A SURVEY OF THE FALL AND WINTER VASCULAR FLORA OF THE PIKE COUNTY POCOSIN, ALABAMA.

James A. Hall, Michael Woods, and Alvin Diamond, Department of Biological Sciences, Troy State University, Troy, AL 36082.

The Pike County Pocosin Nature Preserve is located approximately 6 miles due east of the City of Troy, Alabama. The Preserve consists of 84 hectares of xeric sandy ridges interrupted by deep horseshoe shaped ravines. The ridges support a dwarf oak-lichen community, while the ravines support a varied mesic hardwood forest community. The vascular flora of the Preserve was studied from November of 1999 until February of 2000. A total of 45 species representing 44 genera and 21 families were collected. The largest families were Asteraceae and Poaceae; each represented by 9 species. Funding for this project was provided by the Alabama Department of Conservation and Natural Resources.

UNDERSTANDING EARLY LIFE HISTORY STRATEGIES DURING CULTURE OF THE SEA URCHIN, *LYTECHINUS VARIEGATUS*.

Brenda D. Wallace, Adele W. Cunningham, Minako S. Vickery, Stephen A. Watts, James B. McClintock, UAB, Birmingham, AL 35294. John M. Lawrence, Univ. of South Florida, Tampa, FL 33620.

The sea urchin, *Lytechinus variegatus,* is a common inhabitant of the Gulf of Mexico and is a candidate for fisheries and aquaculture because of the value of the roe. Viable stocking programs would require the production of post-metamorphic juveniles which can only be produced in large numbers by intensive larval culture. We are investigating the nutritional requirements of larval and juvenile sea urchins of this species. Adult sea urchins were injected with KCl and eggs were collected and fertilized in artificial seawater at 32 ppt made from Instant Ocean sea salt and fed either algal or diatom cultures at a concentration of 8 cells/uL. Larvae grew when fed monocultures of *Dunaliella sp.*, *Rhodomonas sp.*, *Isochrysis aff. galbana*, and *Chaetoceros gracilis*, but larvae had the fastest growth rate when fed a mixture of these four species. Development of specific stages, including fertilization, blastula, gastrulation, 2 arm, 4 arm, 6 arm, 8 arm, development of a rudiment, and metamorphosis was similar to that reported in previous studies. Larvae reached metamorphosis as early as 17 days. We were able to culture larvae at times different from natural spawning events in wild populations and, most importantly, we were able to culture larvae in 100% artificial seawater. One young juvenile that was cultured in the laboratory grew rapidly in an aquarium with a mixed algal biofilm. "Egg to egg" culture will be necessary for the development of production technologies that do not depend on diminishing populations of wild-caught individuals. Funded by Sea Grant.

A PUTATIVE NEW SPECIES IN THE GUNUS *RADULA* (HEPATICAE) FROM THE SOUTHEASTERN U.S.

Paul G. Davison, Dept. of Biology, Univ. of North Alabama, Florence, AL 35632.

The genus *Radula* Dumort. is an isolated and well-defined group comprising the whole of the family Radulaceae and the suborder Radulinae. This predominately tropical genus consists of about 250 accepted species as listed by Yamada in 1986. Fourteen species occur in North America, north of Mexico, with ten species occurring in the southeastern U.S. In September, 1998, a new species of *Radula* was discovered on several limestone outcrops around a seasonal cold air vent in karst topography in NE Alabama. This new *Radula* clearly belongs to section *Caducifoliae* Schust. due to the possession of caducous leaves and long attachment of the leaf lobule to the stem. *Radula obconica, R. sullivantii, and R. floridana* are the only North American representatives of section *Caducifoliae*, and the new *Radula* differs from these species in details of lobule attachment, stem anatomy, and dorsal leaf insertion. Comparison with neotropical and Asiatic species is needed.

THE EFFECTS OF DIETARY PROTEIN ON THE PRODUCTION AND PROXIMATE COMPOSITION OF GONADS IN THE SEA URCHIN *LYTECHINUS VARIEGATUS*.

Hugh S. Hammer, Stephen A. Watts, James B. McClintock, UAB, Birmingham, AL 35294-1170. John M. Lawrence, University of South Florida, Tampa, FL 33620. Addison L. Lawrence, Texas A&M University, Port Aransas, TX 78363.

The sea urchin *Lytechinus variegatus* is a common nearshore inhabitant of the Gulf of Mexico and has recently shown promise as an aquaculture/fisheries species for the production of sea urchin roe. Understanding the nutrition and physiology of this species is essential to maximize growth of the roe for individuals reared in culture. Previously starved urchins (ca. 36 mm diameter, n=12) were held in replicated (3x) 80 L aquaria with artificial seawater at 21 °C and 32 ppt salinity for each diet treatment. The urchins were fed one of three isocaloric diets containing 14 (L), 32 (M) or 50% (H) protein *ad libitum* for a 10-week period. Proximate analyses for protein, carbohydrate and lipid were performed on gonad and somatic tissues. The gonad index (wet organ weight / wet individual weight x 100) increased from 0.3 to 10.7, 11.3, and 12.7 over the 10-week period for the L, M, and H protein diets, respectively. The gonad contained 25.7, 31.2, and 41.2% protein and 47.3, 39.7, and 24.6% carbohydrate for the L, M, and H protein diets, respectively. Lipid content averaged 19-22 % and did not vary significantly with diet. These data indicate that the proximate composition of the gonad reflects the relative content of either protein or carbohydrate in the diet and further suggest that the composition of the gonad can be manipulated by varying the diet. Similar trends were not observed in the gut and test.
Funded by Sea Grant.

THE EFFECTS OF TEMPERATURE AND FOOD LEVEL AND QUALITY ON THE INCIDENCE OF CLONING IN PLANKTOTROPHIC LARVAE OF THE SEA STAR *PISASTER OCHRACEUS*.

Minako S. Vickery and James B. McClintock. Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

Asexual reproduction/cloning was first documented in the planktotrophic larvae of sea stars over a decade ago. However, to date, no *in vitro* studies have investigated the factors that may regulate larval cloning in sea stars. The larvae of *Pisaster ochraceus* from the northern Pacific were used to investigate potential factors that may influence the incidence of cloning. In an initial experiment, larvae were raised under nine combinations of temperature and food (phytoplankton). Larvae raised at 12-15 °C and fed the highest levels of food grew larger than the other larvae and produced significantly greater numbers of clones. In a second experiment, qualitatively different algal diets were fed to larvae raised under those conditions deemed optimal in the initial experiment. Up to 24% of the larvae consuming a mixed phytoplankton diet cloned, and significantly greater numbers of clones were produced by these larvae than those fed monospecific algal diets. Our experiments demonstrated that cloning occurs generally after larvae have attained asymptotic body size and only when food is abundant and of high quality. Since larval mortality is considered to be extremely high for marine invertebrates with planktotrophic larvae, production of clones under optimal temperature and food conditions may serve to increase larval populations when the environment is most conducive to larval growth and survival, ultimately enhancing rates of juvenile recruitment.

WAREA IN ALABAMA.

Alvin R. Diamond, Jr., Department of Biological Sciences, Troy State University, Troy, AL 36082.

Warea sessilifolia Nash is known to occur naturally at two widely separated sites in Alabama. A population exists in Pike County in an area know as the Pocosin, and was first reported from there by Roland Harper in 1914. A second population was discovered in Mobile County in 1995. The plant is an annual and exists in sandy disturbed xeric sites. An extensive search of South Alabama revealed no new populations although abundant seemingly suitable habitat exists. To determine if *Warea* was limited due to lack of seed dispersal, seeds were collected from the Pike County site and introduced at four similar sites in South Alabama and monitored for seven years. One population was destroyed by removal of road fill material two years after it was planted, but the other three sites still support populations. At one site the plant has spread over one and a half miles from the site of introduction, apparently due to dispersal of seed by road graters. *Warea* seems to be limited in its distribution due to poor seed dispersal.

EXAMINATION OF AROMATASE AND STEROIDOGENIC FACTOR-1 EXPRESSION DURING TSD IN A REPTILE.

Chris Murdock and Thane Wibbels, Dept. of Biology, Univ. of Ala.-Birmingham, Birmingham, AL 35294.

Steroids, in particular estrogens, have been implicated as possible factors influencing sex determination in reptiles with temperature-dependent sex determination (TSD). In the current study, quantitative RT-PCRs (QRT-PCR) were developed for examining the expression of two factors thought to be involved in this sex determination cascade: Steroidogenic factor-1 (SF-1) and aromatase. These two factors are of particular interest due to their regulatory effects on estrogen production. Employing these QRT-PCRs will allow for highly sensitive assays, by which the expression of both aromatase and SF-1 can be quantified.

Currently, these QRT-PCRs are being used to quantify the abundance of aromatase and SF-1 transcripts during the embryonic stages before, during, and after the sex determining period at both male and female-producing temperatures in red-eared slider turtle, *Trachemys scripta*. Total RNA isolated from adrenal/kidney/gonadal tissues is being used for these assays, and multiple samples are being examined from each stage and temperature. Data acquired from these QRT-PCRs could provide insights into the factors involved in the sex determination cascade during TSD in reptiles.

THE RELATIONSHIP BETWEEN PLANTS SPECTRAL PROPERTIES AND CHLOROPHYLL CONCENTRATION.

Safaa H. Al-Hamdani, Biology Dept. Jacksonville State University. Jacksonville, AL 36265.

This study was carried out on Dugger Mountain (NE Alabama, USA) at the southern terminus of the Appalachians to evaluate the spectral properties of Mountain Laurel (*Kalmia latifolia*) throughout the four seasons. Absorptance of the visible light (400 - 700 nm) was the highest during May followed by April. Light absorptance decreased 19 and 25% during June and August, respectively, compared to May and June. The same results were obtained for the light absorptance during December with the exception that during June and August the percentage of light absorptance in the range of 562 - 594 nm was reduced to 56 %. Near-infrared light (750-800 nm) absorption decreased sharply in comparison to the absorption of visible light at each sampling time. The lowest absorptance value for the near-infrared light was obtained during June and August (39 %), followed in increasing order by December (53 %), May (71 %) and April (75 %). The percentage light absorptance seemed independent of the chlorophyll concentration which gradually increased starting in February through August. Decline in chlorophyll a and b concentration was determined during the months of November through January. Relatively low chlorophyll a:b ratio was obtained throughout the sampling period and this could be considered as an adaptive strategy of Mountain Laurel to low light intensity. In general, light reflected for the visible light and the near-infrared range was lower than 10 % throughout the sampling period with an exception in April when a sharp increase, to slightly above 30 %, in near-infrared reflectance was detected.

A COMPARISON OF PAR AND UV LIGHT TRANSMISSION WITH COMPACT FLUORESCENT, MERCURY VAPOR, AND METAL HALIDE LIGHTING IN A REEF STUDY TANK

Keith L. Roberts Altamont School and Carol A. Leitner, M.D., Dept. of Surgery, Univ. of Ala. Birmingham 35233

This project studied the effectiveness of marine aquarium lighting utilizing measurements of photosynthetic photon flux(PAR) and ultraviolet radiation(UV). PAR covers the entire photosynthetic range of 440-700 nanometers and determines the radiation available for algae photosynthesis.UV light is injurious to corals and some plants. A 30-gallon marine aquarium with a submersible 1-inch nylon grid was constructed for study. Quantum(PAR) and UV meters with waterproof probes were used to measure PAR and UV radiation at the surface , 5-inch and 12-inch depths for three types of aquarium lights. The homemade 152-watt, 4-bulb compact fluorescent fixture provided 280 microEinsteins PAR and negligible UV radiation at a ten-inch depth. The metal halide fixture furnished 268 microEinsteins PAR and negligible UV radiation at 10-inches. The mercury vapor bulb, marketed as Weiss Wonderlite, supplied the highest PAR values but emitted significant amounts of UV radiation even at ten inches. Placed at the water's surface, Acrylite OP-3 allowed transmission of adequate PAR and effectively eliminated UV radiation for the Wonderlite.The results of PAR and UV measurements were shown in 3-D surface fill graphing technique to illustrate the relative effectiveness of each fixture and its light distribution in the tank.

PRESENCE AND POTENTIAL ROLES OF G-PROTEINS IN Y-ORGANS OF THE BLUE CRAB, CALLINECTES SAPIDUS.

Deug Woo Han and R. Douglas Watson, Department of Biology, University of Alabama at Birmingham, AL 35294.

The synthesis of ecdysteroid molting hormones by crustacean Y-organs is negatively regulated by molt-inhibiting hormone (MIH) a neuropeptide produced and released from eyestalk neurosecretory cells. Several lines of evidence suggest that MIH action on Y-organs is mediated by an increase in intracellular cAMP levels. To better understand the link between MIH receptor occupancy and Y-organ cAMP levels, we have assessed the presence of GTP-binding proteins (G-proteins) in Y-organs of the blue crab (Callinectes sapidus). We report here the presence of G-proteins in Y-organs and thoracic ganglia as determined by ADP-ribosylation catalyzed by bacterial toxins. A pertussis toxin (PTX)-sensitive G-protein (~ 45kD) was detected in both thoracic ganglia and Y-organs. A cholera toxin (CTX)-sensitive G-protein (~ 49 kD) was detected in ganglia, but not in Y-organs. The results suggest that CTX-sensitive G-proteins are absent or scant in Y-organs. Western blot analyses of G-proteins in Y-organs and ganglia are in progress. Funded by MS/AL Sea Grant NA86RG0039.

ESTROGEN, ESTROGEN AGONISTS, AND ESTROGEN ANTAGONISTS IN TILAPIA: EFFECTS ON SEX DIFFERENTIATION AND GONADAL MATURATION. Melody G. Duvall, C. B. Rowell and S.A. Watts, University of Alabama at Birmingham, Birmingham, AL 35294-1170. G.C. Mair, University of Swansea, UK.

The significance of estrogens in controlling physiological and developmental events has been postulated but not demonstrated in many fish species including tilapia. Estrogens such as estrone, estradiol and estriol have been identified by either radioimmunoassay or steroidogenic assays in tilapia during the period of sex differentiation and later during gonadal maturation. Evidence that estrogens are involved during sexual differentiation include the induction of ovarian development in genetic males by the exogenous application of natural estrogens such as estradiol, and also estrogen agonists such as diethystilbesterol and ethynylestradiol. Also, application of estrogen antagonists such as tamoxifen, and aromatase inhibitors such as fadrazole have successfully sex-reversed genetic females to phenotypic males. However, natural estrogen synthesis during the proposed period of steroid-sensitive sex differentiation has not been demonstrated. Similarly, levels of estradiol and estrone increase prior to and during ovarian and testicular maturation, suggesting further that estrogen levels are important in gonadal maturation. Ultimately, the efficacy and action of steroids are dependent on the presence of receptors for that steroid. Recently, the sequence of the α and β subtypes of estrogen receptor (ER) have been reported in tilapia. We have developed primers which can be used to determine the expression of these genes at critical periods during sex differentiation and gonadal maturation. Changes in receptor affinity and concentration likely affect the degree to which steroids exert their influence. Characterizing estrogen receptors will allow us to better understand how estrogen, and estrogen agonists and antagonists, can affect sex differentiation and gonadal maturation in fish.

GENETIC DIVERSITY AMONG SPOTTED SALAMANDER, *AMBYSTOMA MACULATUM*, POPULATIONS. Misti H. Wilson, Charles A. Matheny, Jose' G. Rodriguez and Mark E. Meade, Dept. of Biology, Jacksonville State University, Jacksonville AL 36265.

Spotted salamanders are members of the mole family of salamanders, Ambystomatidae. *Ambystoma maculatum* is native to the eastern regions of the US ranging from Maine to Georgia extending west to Missouri and eastern Texas. Migration patterns of spotted salamander populations often demonstrate the recurrence of individuals to a common breeding area. Such observations suggest that genetic diversity would be low among individual breeding populations. Isozyme profiles were examined in individuals known to occupy common breeding areas. Several tissues, including heart, abdominal muscle, limb muscle, brain, and liver, were examined using standard IEF electrophoresis protocols. Preliminary analysis suggests high homologies of the enzyme systems. Nonetheless, unique profiles were apparent in some individuals suggesting that migration to breeding areas may vary. Analysis of isozyme profiles among other breeding populations of spotted salamanders are currently underway to determine the extent of diversity between breeding populations. The authors wish to thank Mr. Eric Blackwell and Dr. George Cline for collection of animals and interpretation of results.

LIGHT BOUNDARIES AND THE COUPLED EFFECTS OF SURFACE HYDROPHOBICITY AND LIGHT ON SPORE SETTLEMENT IN THE BROWN ALGA *HINCKSIA IRREGULARIS*.

Stephen P. Greer and Charles D. Amsler, Department of Biology, University of Alabama at Birmingham, Birmingham, AL 35294-1170.

We examined the effects of light and surface hydrophobicity in tandem and individually upon *Hincksia irregularis* spore settlement. Through the use of computer-assisted motion analysis, *H. irregularis* spores were quantitatively determined to be negatively phototactic at irradiance levels greater than 75 µmole quanta m^{-2} sec^{-1}. Experiments on ninety-six well microtiter plates showed neither presence nor direction of light during settlement significantly affected spore settlement over 30 minutes. However, spore settlement was significantly influenced by surface hydrophobicity in the dark. Experiments on larger prepared 12-well plates revealed significant settlement preferences for hydrophobic surfaces and dark environments. Additional experiments conducted on 12-well plates in the presence a light/dark boundary revealed significant differences with regard to spore settlement behavior on charged and non-charged surfaces. These results demonstrate *H. irregularis* spores possess a unique capacity for complex response to their environment.
Supported by Mississippi-Alabama Sea Grant Consortium award R/MT-40.

THE BIOLOGY OF CRYPTOBIOSIS: TARDIGRADA.

Frank A Romano, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

Tardigrades are cosmopolitan in their distribution and are found in a variety of habitats; marine systems, aquatic systems, and in wet terrestrial systems. All tardigrades must live with water, primarily for respiratory reasons, thus tardigrades are thought of as limno-terrestrial. Terrestrial habitats that support tardigrades are soil and leaf litter and in the water trapped within moss and lichens. Cryptobiosis is a state of suspended animation, or latent state, that is a celebrated feature of tardigrade biology. Reductions or suspension in metabolic activities and temporary cessation of growth and reproduction characterizes these latent states. An important feature of this latent state is the ability to withstand environmental extremes such as cold, heat, drought, chemicals, and ionizing radiation. Under these extreme conditions the latent organism shows no signs of life, but they may resume normal activity when favorable conditions return. Crowe (1974) discusses several types of latent states among tardigrades including anhydrobiosis, the cryptobiotic state induced by desiccation, the state that most limno-terrestrial tardigrades must survive. As the film of water surrounding a tardigrade evaporates, the animal responds by altering its physiology and cuticle forming a tun, which is exceedingly resistant to extreme environmental conditions.

BIODIVERSITY OF THE FRESHWATER TURTLE COMMUNITY IN THE WEEKS BAY WATERSHED. Krista K. van Amerongen and David H. Nelson, Department of Biological Sciences, University of South Alabama, Mobile, AL 36688.

Adjacent to the Mobile Bay, the Weeks Bay estuary provides a plethora of aquatic habitats for resident turtle species. This project concentrates on assessing the biodiversity of the freshwater turtle community and estimating the relative densities of each species. Trapping extended from May 28, 1999 to September 25, 1999. Turtles were collected using aquatic hoop traps with a 12-m lead net in the center. Captured turtles were identified to species, sexed, and weighed; seven different shell measurements were also taken. Turtles were marked by drilling a pattern of holes in the marginal scutes of the carapace. Each turtle received a unique number that allowed identification upon recapture. There were a total of 687 turtles captured with *Pseudemys concinna* (River cooters) accounting for 57% of the community. *Pseudemys floridana* (Florida cooters) made up 19.5%, and the endangered *Pseudemys alabamensis* (Alabama redbelly turtle) made up 18% of the community. The remaining 5.5% consisted of *Deirochelys reticularia* (Chicken turtles), *Apalone spinifera* (Spiny softshell turtles), *Chelydra serpentina* (Common snapping turtles), and *Macroclemys temminckii* (Alligator snapping turtles). A total of 117 turtles, representing five different species, were recaptured. Three turtle species had significant recapture rates: *P. floridana* (18.7%), *P. concinna* (18.1%), *P. alabamensis* (11.2%). This project will continue through August 2000 with funding from the National Oceanic and Atmospheric Administration.

BLACK BELT MOSSES AND LIVERWORTS. Donna H. Miller, Harvey A. Miller, Shiloh Jones and Paul Sparkman, Dept. of Biology & Environmental Science, Univ. of W. Ala., Livingston, AL 35470.

The Black Belt Physiographic Province extends across Alabama in a gentle arc from southern Pickens and northern Sumter counties eastward through Montgomery and ending at the junction of Bullock, Mason and Russell Counties. Because of the extensive chalk exposures and the shallow soils over the chalk, the vegetation differs markedly from that in other areas of the state. Despite the unique nature of the black belt area, little seems to have been published concerning the botany of the area, especially for the mosses and liverworts. Montgomery County has the largest reported flora with 28 mosses and no hepatics reported but these are not all from the black belt area. Our field studies have added dozens of new county records within the black belt and unusual or rare species have been discovered including *Pleurochaete squarrosa*, several *Tortella* species and *Tortula propagulosa* which appears to be new to Alabama. Liverworts found include several species of *Frullania, Lejeunea, Porella, Pellia, and Reboulia*. Correlations were found between the Black belt bryophytes and those known from the chalk downs of England.

SAW PALMETTO: AN EFFECTIVE FORM OF PHYTOTHERAPY IN THE INHIBITION OF PROSTATE ENLARGEMENT?

Kimberly Green and P. S. Campbell, Department of Biological Sciences, The University of Alabama in Huntsville, Huntsville, AL 35899.

The use of saw palmetto extract to self-treat benign prostate hyperplasia (BPH) is becoming increasingly common in the United States. However, there are few scientific studies that adequately document the medical efficacy of this herbal remedy. This study was undertaken to ascertain whether a commercial over-the-counter preparation of saw palmetto extract might inhibit prostate growth. Young, adult male castrated (2 weeks) or intact mice were fed 20 mg saw palmetto extract per day for two weeks. Controls were fed 0.1 ml of the peanut oil vehicle. The castrated male were subsequently divided into four groups after one week of treatment and injected subcutaneously (sc) each day for the second week of treatment with either 500 μg testosterone or 500 μg 5α-dihydrotestosterone (DHT) dissolved in peanut oil. The saw palmetto treatment reduced the testosterone-induced growth of the atrophied prostate but not that in the DHT-treated subjects. Furthermore, saw palmetto treatment did not affect the size of the prostate in the intact subjects. The data would appear to suggest that saw palmetto extract may not cause regression of BPH as much as it may limit its progression. Thus, there does appear to be a rational basis for a possible beneficial therapeutic action of saw palmetto on prostate function.

THE SELLA TURCICA OF THE SPINNER DOLPHIN.

Gerald T. Regan, Dept. of Biology, Spring Hill College, Mobile, AL 36608 and Cheryl A. King, P.O. Box 115, Gulf Shores, AL 36547.

A spinner dolphin, *Stenella longirostris,* from the Gulf of Mexico has both an anterior and a posterior clinoid process bordering its sella turcica. A clinoid process is a kind of upturned rim of bone. The spinner sella resembles the sella of an adult human more than it does the sella of other cetaceans. A ratio of length of sella to maximum depth measured on a median sagittal section of a sella for most other cetaceans is about 30:1, and they lack a posterior clinoid process. For the spinner dolphin that ratio is 1.6:1, and for the human sella it is 2.2:1. The ratio for an Atlantic spotted dolphin, *Stenella frontalis,* is also 1.6:1, but the anterior clinoid process is extremely long. and the posterior clinoid process is highly reduced. Beginning with a latex mold of the whole sella, median sagittal sections were made by a single cut through the median sagittal plane of the mold. The cut edge of the mold was positioned snugly against a blank microscope slide, and mold and slide were held in position by silicone caulk. The casting medium was then applied to this half-mold. The medium that was successful was patching epoxy for automobile sheet metal. After the replica had cured, it was placed median edge down on a photocopy machine and enlarged to twice the natural size. The measurements of length and depth were made on the image produced by the copy machine.

VALIDATION OF A NON-INVASIVE SEXING TECHNIQUE FOR JUVENILE HAWKSBILL SEA TURTLES.

Alyssa A. Geis and Thane Wibbels, Dept. of Biology, Univ. of Ala.-Birmingham, Birmingham, AL 35294.

Sea turtles possess temperature-dependent sex determination. As such, the resulting sex ratios are of conservational and evolutionary significance. Juvenile sea turtles do not have any secondary sexual characteristics which can be used to identify sex. Therefore, previous studies have employed techniques such as invasive surgical procedures by which morphological differences in gonads could be seen through a laparoscope. In the current study we evaluate an alternate sexing technique. Blood samples were obtained from juvenile hawksbill sea turtles captured on Buck Island Reef National Monument over the past several years. Buck Island Reef is an optimal location for sex ratio studies since it represents a natural and unexploited foraging ground for hawksbill sea turtles in the Caribbean. A radioimmunoassay was utilized to determine testosterone titers in those samples. The values obtained were compared to testosterone levels of juvenile hawksbills from the Caribbean, in which the sex has been verified by laparoscopy. The results indicated a female bias in the group of juvenile turtles sampled in this study. The results also indicate that testosterone levels can provide a practical and effective means of estimating sex ratios of juvenile hawksbill sea turtles inhabiting Buck Island Reef.

ADAPTIVE COLD TOLERANCE RESPONSE IN *Vibrio vulnificus*.

Greer Kaufman and Asim K. Bej, Dept. of Biology, Univ. of Alabama at Birmingham, AL 35294-1170.

Vibrio vulnificus is a natural inhabitant of coastal waters and remains dormant during the winter months. To study the adaptive nature at cold temperatures, *V. vulnificus* cultures were grown at 35°C, 15°C, 6°C, and 15°C→6°C in gulf water supplemented with (a) 0.2% yeast extract, (b) 0.5% casamino acid, (c) 0.5% peptone, or (d) 0.5% casamino acid along with 0.5% peptone. When comparing the cultures incubated at 6 °C, cells remained viable for >72h in gulf water supplemented with 0.5% casamino acid. A 1-2 log increase in viability was observed by the cultures that were grown in medium containing casamino acid. Viability of cultures grown in gulf water supplemented with 0.5 % peptone along with 0.5% casamino acid at 15 °C→6 °C increased 1-2 log and was maintained for >161h. Also, cultures grown in the presence of casamino acid remained viable for >93h. This suggests that peptone and casamino acid allow *V. vulnificus* to better adapt to cold temperatures. O'Farrel 2-dimensional protein gel, labeled with ^{35}S-methionine, exhibited elevated expression of at least 18 polypeptides and reduced expression of 18 polypeptides between *V. vulnificus* cultures exposed to 35°C and 15°C. This suggests that for growth and survival at cold temperature *V. vulnificus* mounts a global cellular response. A homolog of *Escherichia coli* and *Shewanella violacea cspA* was identified in *V. vulnificus* by PCR amplification. The amino acid sequence of *V. vulnificus* CspA exhibited 82% and 88% homologies with *E. coli* and *S. violacea*, respectively. The possible role of these cold shock proteins in the adaptation of *V. vulnificus* grown in gulf water supplemented with a defined carbon source at cold temperatures is currently being investigated.

Age as a Variable in the Induced Masculinization of Female Mosquitofish *Gambusia affinis*. Meleth, A.D. and Angus R.A., dept of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

Age is an understudied variable with respect to teleost endocrine disruption. This experiment investigates whether age is a variable of response to the induced masculinization of female mosquitofish *Gambusia affinis*. In mature male poeciliids the anal fin differentiates into an elongated structure called the gonopodium, used for sperm-transfer into the female genitalia during copulation. The development of the gonopodium involves the lengthening and thickening of anal fin rays 3-5; the formation of a termination complex at the tip of the fin signals completion of development. Gonopodial development can be induced in female mosquitofish through exposure to androgens and the effects can be measured quantitatively using morphological changes in the anal fins. In this experiment five different age groups were used and were classified by age at the beginning of the experiment: 92 days old, 137 days old, 199 days old, 248 days old, and 448 days old. Masculinization was induced through dietary exposure of 50 μg/g methyl-testosterone and anal fins were photographed weekly throughout the masculinization process. Experimental results suggest masculinization with respect to age follows a bell-shaped trend with the 199 day old group responding the most. However the 137 day old group did not follow this trend, showing little response to androgen exposure.

BALBIANI BODIES IN CRICKET OOCYTES.
Falany, M[1], M. Kloc[3], K. Wolfe[2], B. Estridge[1] and J.T. Bradley[1]
[1]Department of Zoology, College of Science and Mathematics and [2]Department of Anatomy, School of Veterinary Medicine Auburn University, Auburn, AL 36849 and [3] University of Texas M.D. Anderson Cancer Center, Department of Molecular Genetics, Houston, TX 77030.

Formation of two spherical nuage/ Balbiani bodies along the long axis of previtellogenic oocytes in *Acheta domestica* was demonstrated by differential interference microscopy. Both form adjacent to and on opposite sides of the germinal vesicle, the anterior body earliest. Each migrates to the nearest pole of the elongating oocyte and retains its spherical structure until occluded from view by accumulating yolk. In situ hybridization, immunocytochemistry, confocal immunoflourescent microscopy, and Southern blotting demonstrated the presence of gamma tubulin, α-tubulin, EF1α, and several RNAs homologous to *Xenopus* RNAs implicated in embryonic axis formation or germ cell determination. The latter include Xcat, Xwnt, X1sirt, and Xpet. The results suggest that the molecules and mechanisms specifying early determinative events for embryogenesis in vertebrates and insects are higly conserved. Supported by the Alabama Agricultural Experiment Station the Dean's Research Initiative (COSAM), Auburn University, and the NIH.

ANALYSIS OF THE EFFECTS OF SELECTIVE CHOLINERGIC AGENTS ON DIGESTIVE ENZYME RELEASE FROM AN EMBRYONIC CHICK ORGAN CULTURE SYSTEM. Lydell Collier and A. D. Johnson, Department of Biological Sciences, University of Alabama in Huntsville, Huntsville, Alabama 35899. J. U. Johnson, Department of Food Science, Alabama A & M University, Normal, Alabama 35762.

Nutrient utilization by an animal involves neural regulation of digestive enzymes released by the pancreas for disassemble of macromolecules. An embryonic chick pancreatic culture system has been used in our laboratory to determine whether the muscarinic receptor subtype for chick pancreatic cells is characteristic to the mammalian M_3 glandular subtype. Previous studies in our laboratory using pharmacological levels of synthetic muscarinic agonists and antagonists have demonstrated the regulatory capacity of the M_3 receptors for chick exocrine pancreatic tissue. Preliminary localization studies involving synthetic cholinergic agents and immunofluorescent techniques will be used to determine the specificity of the muscarinic M_3 receptor subtype in the embryonic chick pancreatic tissue. The procedure for indirect immunofluorescence will involve the use of a rabbit-anti-M_3 receptor IgG (1° antibody), followed by FITC-conjugated goat anti-rabbit IgG (2° antibody) and observed using fluorescence microscopy. These studies will be important for the potential development of compounds specific for regulation of pancreatic enzyme release, which could enhance carbohydrate metabolism in domestic animals.

EFFECT OF SERUM ON GROWTH OF AN OPPORTUNISTIC PATHOGEN *Corynebacterium jeikeium*. Michael L. Myers and Asim K. Bej, Dept. of Biology, Univ. of Alabama at Birmingham, AL 35294-1170.

Serum-induced genes have been identified and characterized in eukaryotic systems, but have not been reported in prokaryotes. *Corynebacterium jeikeium* is an opportunistic pathogen known to cause infection in humans. Culturing of this bacterium in nutrient broth is slow with very light growth. However, *C. jeikeium* flourishes in medium supplemented with serum (10% v/v) growing at an increased rate and density. The genetic mechanism for such rapid growth when exposed to a medium supplemented with serum was investigated. In addition, the effect of physiologically important metal cations on the growth of *C. jeikeium* in serum was determined. It was found that addition of Mg^{2+} is essential for enhanced growth in medium supplemented with serum, while other divalent cations such as Ca^{2+}, Cu^{2+}, Fe^{2+}, Mn^{2+}, and Zn^{2+} had no apparent effect. To determine if serum-induced genes are present in *C. jeikeium*, cultures were grown in a medium supplemented with serum and total cellular proteins were labeled with ^{35}S-methionine. Differential expression of a protein with an approximate molecular weight of 36 kDa was detected and sequenced at its N-terminus end. A degenerate oligonucleotide probe, PCSIP-36, was synthesized from the deduced amino acid sequence of this protein. The probe PCSIP-36 hybridized to purified *C. jeikeium* genomic DNA which was treated with a restriction endonuclease. These findings suggest there may be a gene in *C. jeikeium* expressed in response to serum which may have a significant role in the rapid growth of this pathogen when grown in medium supplemented with serum. This information could be useful in understanding human infection caused by *C. jeikeium* and other blood-borne pathogens.

Effects of Masculinization on the Reproductive Fitness of Female Mosquitofish *Gambusia affinis*. Stanko, J.P. and Angus, R.A., Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

To date, studies on environmental endocrine disruptors have primarily concentrated on chemicals with estrogenic effects. This is because many chemicals which humans have introduced into the environment, such as organochlorine pesticides and PCB's, have estrogenic activity. However, examples of environmental androgens have also been documented. Howell et al. reported populations of masculinized eastern mosquitofish (*Gambusia holbrooki*), inhabiting streams receiving effluent from paper mills, in which the females showed modifications of the anal fins into normally male-associated gonopodium-like structures. We are currently investigating the reproductive effects resulting from exposure to androgens, as well as the mechanisms through which androgens exert their effects. In this experiment, female *G. affinis* were masculinized through dietary exposure of the known masculinizing agent 17α-methyltestosterone. Preliminary results indicate a reduced gonadosomatic index, aberrations to developing oocytes, and inhibition of vitellogenesis. In a collaborative effort, Howell, et al. (Samford University, Birmingham, AL) are currently attempting to identify the bioactive constituents of paper mill effluent in which masculinized populations of mosquitofish have been observed. Once identified, we will use these same experiments to investigate the masculinizing effects of the constituent(s). This work supported by EPA Grant R826130-01-0.

CHARACTERIZATION OF NOVEL GENES EXPRESSED DURING LARVAL SEA STAR REGENERATION. Michael C. L. Vickery, Minako S. Vickery, James B. McClintock, and Charles D. Amsler, Department of Biology, University of Alabama at Birmingham, AL 35294.

We recently reported that larval sea stars are capable of complete regeneration of missing body parts, providing a new deuterostome model for the study of regeneration. In the present study, bipinnaria larvae of the sea star *Luidia foliolata* were surgically bisected in order to induce regeneration. Using suppression PCR cDNA subtractive hybridization between regenerating larvae and uncut controls, we identified 9 cDNA fragments representing early regeneration-specific gene expression. One cDNA, for which the complete coding sequence was obtained, showed strong homology to numerous serine proteases – including trypsin and plasmin. Another cDNA had partial homology to a protein kinase receptor. The remaining fragments showed no significant homology to any GenBank sequences. Plasminogen plays an important role in early regeneration and wound repair in vertebrates, and there are similarities between echinoderm coelomocytes and the immune systems of vertebrates. We propose that the sea star regeneration-associated protease gene identified in this study, designated *S-rap,* may have a function analogous to that of vertebrate plasminogen, aiding in early reepithelialization at the site of injury. It may also play a role in apoptosis during re-development of the larval body, as proteases are known to play a key role in apoptosis throughout embryonic development. Funded by UAB, SICB, SIGMA XI, and AAS.

EFFECTS OF PAPER MILL EFFLUENT ON A POPULATION OF EASTERN MOSQUITOFISH, *GAMBUSIA HOLBROOKI*, AND TENTATIVE IDENTIFICATION OF THE BIOACTIVE EFFLUENT CONSTITUENTS.

Heather B. McNatt and Robert A. Angus, Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294-1170. Ronald L. Jenkins and William M. Howell, Samford University, Birmingham. AL 35229-2234. Elizabeth M. Wilson, Laboratories for Reproductive Biology, Univ. of N. Carolina, Chapel Hill, NC 27599.

A population of eastern mosquitofish, *Gambusia holbrooki*, living below the Buckeye paper mill on the Fenholloway River in Perry, FL appear to be masculinized. Partial growth of a gonopodium (modified anal fin used by males in reproduction) is evident in females, thereby indicating some degree of masculinization. Verification of masculinization of Fenholloway females by mill effluent was determined through comparisons of length ratios of anal fin rays 4 and 6 and width ratios of 3 and 4 to same ratios from normal females in a tributary to the river, Spring Creek. In addition the effects of effluent on female reproductive status was determined through comparison of standard length, number of embryos and mature ova per female, and size of embryos and mature ova from Fenholloway females to Spring Creek females. HPLC, androgen-binding assays, and LC-MS were used to determine the presence of any bioactive constituents in the mill effluent. We have tentatively identified 11-deoxycorticosterone, androstadienedione, and androstenedione in the effluent.

ANALYSIS OF POLYMORPHIC ENZYME SYSTEMS AMONG TILAPIA, *OREOCHROMIS SPP.*

Joseph C. Guthrie and Mark E. Meade, Dept. of Biology, Jacksonville State University, Jacksonville AL 36265.

Tilapia are members of the Cichlid family of fishes, one of the oldest known families of fish existing today. Tilapia were originally native to Africa and the Middle East however, because of commercial exploitation, naturalized populations now exist in tropical and semi-tropical regions of the western hemisphere and the Orient. Members of the genus *Oreochromis* are mouth brooders that have the capacity to spawn continually under the proper environmental conditions. Members of this genus also interbreed often resulting in the inability to distinguish among the various species. Because of the commercial importance of tilapia, there is concern of the potential for inbreeding depression and subsequent loss of genetic diversity among the species. During the last 15 months, we have examined isozyme profiles from various tissues of four species of tilapia, *Oreochromis nilotica*, *O. aurea*, *O. mossambique*, and *O. honorum*. Overall, with few exceptions, these species share high homologies among the enzyme systems studied. Details of tissues and enzyme systems examined as well as the implications of our results are to be discussed. This project was supported in part by a JSU Faculty/Student Research grant and by the JSU Dept. of Biology.

NESTING OF THE LOGGERHEAD SEA TURTLE (CARETTA CARETTA) ON DAUPHIN ISLAND, ALABAMA. David H. Nelson and T. Joshua Meyer, Department of Biological Sciences, University of South Alabama, Mobile, AL 36688.

This is the fifth, successive (and final) year of monitoring nesting sites of loggerhead sea turtles. Systematic field surveys for sea turtle nests were conducted from June to October 1999 along the gulf-side beaches of Dauphin Island (Mobile Co.), Alabama. The beach was monitored three times a week by all-terrain vehicle to identify, locate, protect and mark individual nests. Specific coordinates of nests and false crawls were recorded using a hand-held GPS unit. During the 1999 nesting season, we confirmed 3 nests, 10 false crawls and 5 strandings of dead, adult sea turtles. Hatching success for 2 nests was 124/125 (99.2%) and 103/104 (99.0%). The third nest was lost during a storm. Over the past 5 years (1995-1999), confirmed nests have ranged from 2 to 8 nests yearly ($\bar{x}$ = 4.0). Hatchlings have emerged from 1 to 4 nests yearly ($\bar{x}$ = 2.2). False crawls have ranged from 2 to 10 each year ($\bar{x}$ = 4.8). Over the 5-year period, hatching success rates for 5 nests were 0%, 15.7%, 73.3%, 99.0% and 99.2% ($\bar{x}$ = 57.4%). Although sea turtle nesting has occurred on Dauphin Island for each of the past 5 years, nesting activity there has not been great.

EFFECT OF GLYCATION REVERSAL AGENTS ON GLUCOSE TOXICITY IN A HALOPHILIC BACTERIUM ISOLATED FROM AN INLAND SALT SPRING. Donald W. Salter and Archie Hooper IV, Department of Biology and Environmental Sciences, College of Natural Sciences and Mathematics, University of West Alabama, Livingston, AL 35470

Glucose toxicity has been observed in a halophilic bacterium, RS6GS, isolated from an inland salt spring near Jackson, AL. There are at least two possible mechanisms for this toxicity: Production of toxic levels of methylglyoxal through glucose metabolism with subsequent glycation of key cellular proteins, and direct glycation of key cellular proteins by glucose. We first examined the toxicity of methylglyoxal (MG) and non-metabolizable glucose analogs, 2-deoxyglucose (2DG) and 3-O-methylglucose (3MG) on RS6GS and two control bacteria: RS10, another halophile isolated from the same salt springs area, and RS6GR, a variant or mutant of RS6GS that grows normally in a glucose-containing medium. MG appeared to be about 10-fold more toxic to RS6GS and RS6GR than RS10. The two glucose analogs, 2DG and 3MG, did not mimic glucose toxicity. Surprisingly and in contrast to the growth inhibition by glucose, 2DG selectively stimulated the growth of RS6GS. We also tested several glycation reversal reagents for their ability to reverse the glucose toxicity in RS6GS and their effect on the control bacteria. Metformin, aminoguanidine, reduced glutathione, and acetaldehyde at several concentrations had a slight, if any, effect in preventing glucose from inhibiting the growth of RS6GS. In conclusion, some of the data is suggestive of MG involvement in glucose toxicity in RS6GS. Future studies will center on quantifying the concentration of MG within RS6GS, RS6GR, and RS10 cells and in their growth media, and investigating the MG-detoxifying pathway in these bacteria.

COLOR VISION SENSITIVITY IN PRIMATES AND GOLDFISH. Michael S. Loop and David Evans, Dept. of Physiological Optics, UAB, B'ham, AL 35222.

Using behavioral testing, normal humans, macaque monkey, and goldfish can discriminate the color of a spectral light, added to a white background, at detection threshold intensity. This high color vision sensitivity encouraged us to perform an unconventional experiment in which detection thresholds were determined for a white light, with and without, a long pass color filter (Kodak #25 / red). Although the red filter reduced the intensity of the light at all wavelengths (luminous transmission 22%) detection thresholds *improved* by about 0.3 log units in humans and macaque ($p<.008$). The goldfish' detection thresholds were unaffected by the red filter, neither better nor worse.

The high color vision sensitivity of primates (macaque and humans) may be explained by the fact that the cone inputs to excitation and inhibition are different in wavelength opponent neurons but are the same in non-wavelength opponent neurons. If this explanation is correct, it predicts that color will improve the delectability in any species with similar cone input rules to wavelength opponent and non-wavelength opponent neurons. Goldfish, however, possess some non-wavelength opponent neurons that lack inhibition all together and receive excitation only from 'red' cones. We believe this explains the facts that the red filter had no effect upon goldfish detection thresholds, but improved human and macaque detection thresholds. Supported, in part, by NIH/EY11552-02 to T. Gawne.

RESPONSE AND TOLERANCE OF *Vibrio cholerae* O1 TO COLD TEMPERATURES. Madalina C. Mateescu and Asim K. Bej, Dept. of Biology, Univ. of Alabama at Birmingham, AL 35294-1170.

Survival and tolerance to cold temperatures along with differential expression of cellular proteins were evaluated in a wild-type *Vibrio cholerae* O1 strain ($rpoS^+$) and a rpoS mutant strain ($rpoS^-$). Cultures of *V. cholerae* O1 when exposed to 8°C directly from 37°C exhibited rapid loss of culturability in both $rpoS^+$ and $rpoS^-$ strains. At 12°C, the $rpoS^+$ strain of *V. cholerae* O1 exhibited a higher tolerance than the $rpoS^-$ strain suggesting that sigma S plays an important role in *V. cholerae* O1 tolerance at 12°C. However, cultures first exposed to 12°C for 2 h followed by incubation at 8°C failed to demonstrate adaptive response when compared with the cultures transferred directly from 37°C to 8°C. Total cellular proteins labeled with ^{35}S-methionine/cysteine of the $rpoS^+$ strain of *V. cholerae* O1 cultures exposed to 12°C for 2 h exhibited elevated expression of a 8 kDa and a 26 kDa protein and decreased expression of a 28 kDa protein. Ten amino acid residues from the N-terminus end of the 28 kDa protein showed 80 % homology with *Escherichia coli* thioredoxin, a protein that catalyzes reduction of a disulfide bond or oxidation of a thiol to a disulfide in cytoplasmic proteins. The lack of adaptation at 8°C after incubation at 12°C for 2 h of *V. cholerae* O1 $rpoS^+$ and $rpoS^-$ strains seems independent of sigma S function and could be attributed to these differentially expresed cold-responsive proteins. Characterization and role of the cold-responsive proteins and sigma S, as well as the role of thioredoxin in the survival and tolerance of *V. cholerae* O1 to cold temperatures are currently being investigated.

COMPOSITION OF THE DIET OF THE ALABAMA REDBELLY TURTLE (*PSEUDEMYS ALABAMENSIS*). William M. Turner and David H. Nelson. Dept. of Biology, Univ. of South Alabama, Mobile, Al 36688.

The Alabama Redbelly turtle is an endangered species endemic to the Mobile and Tensaw river systems. Stomach flushing was used to investigate the diet of these turtles. Eighty-three turtles from Gravine island (Baldwin county, Al) and five turtles from Weeks Bay (Baldwin county, Al) were captured from May 28th until October 15th of 1999 using aquatic hoop nets. Stomach flushing was attempted on all Alabama Redbelly turtles, and was successful 45% of the time (40 turtles). Seven of the turtles were sampled, released, recaptured and then sampled again. They were examined upon recapture and appeared to suffer no ill effects from the procedure. Samples were separated into species. The mass of each species was recorded in grams. The samples were then dried overnight at 120 C and weighed again. Non-native vegetation occurred most frequently (86%) in all samples and contributed the majority (94%) of the dry biomass. The most frequently encountered plant was *Hydrilla verticillata*, which occurred in 79% of the samples. *Hydrilla verticillata* made up 86% (16.7 grams) of the total dry mass (19.9 grams) of the samples. Other plants found in the samples included *Sagitarria lancifolia, Heteranthera dubia, Myriophyllum spicatum*, and *Vallisneria americana*. Although the diet was essential herbivorous. samples were also found to contain invertebrates. The most common invertebrates found were nematodes (9 specimens) and monogeneric trematodes (3 specimens). There were also remains of fiddler crabs in two samples.

CAGE CULTURE OF TILAPIA IN RURAL FARM PONDS. Stephen A. Watts, Univ. Alabama, Birmingham, AL. 35294-1170. Paul W. Kennedy, USDA-NRCS, 2112 11th Ave. S., Birmingham, AL 35205. David Cunningham, Riverridge Drive, Birmingham, AL 35244.

Recent laboratory investigations have shown that a strain of the tilapia, *Oreochromis niloticus* (Egypt-Swansea strain), can be crossbred such that 98% male progeny can be produced (genetically male tilapia, GMT) through paired matings. The fish showed superior growth in laboratory trials. Because fish culture can provide an economic opportunity for rural farmers, we have initiated demonstrations to determine if GMT can be grown locally using existing infrastructure (ponds) in rural Alabama. Two cages (1.2 x 1.8 x 1.2 m) were each stocked with 800 GMT in June, 1999 (ca. 300 fish/m3) in a 0.4 ha pond in Shelby County. Fish were stocked in one cage June 3 (mean 41 g) and in the other cage June 18 (mean 35 g). Fish were fed a floating catfish diet (32% protein) to satiation twice daily. On July 27 fish in each cage weighed 285 g and 182 g, respectively, exhibiting a specific growth rate of 3.6 and 4.2 % body weight gain/day. In August, high temperatures (ca. 36.5 C) and low oxygen (ca. 1 mg/L) were correlated with a reduced consumption of feed. Mean weight of the fish increased to 435 and 318 g by September 24. Fish were grown until mid-October and sold locally. Ninety-five percent of the fish survived. Economic analysis indicated that capital expenditures (cages, feed, fingerlings) were recovered in the first year and that fish were sold at a reasonable profit (gross revenues of $1,964 vs $1286 capital expenses). Cage culture of tilapia could provide diversification and result in additional economic opportunities for small farms.

PROGRAMMED CELL DEATH: A ROLE IN THE TOXICITY OF THE THERAPEUTIC IMIDATES. V. B. Richardson, Dept. of Biology, Tuskegee University Tuskegee, AL 36088. S. M. Morris, O. E. Domon, L. J. McGarrity and D. A. Casciano, National Center for Toxicological Research (NCTR), Jefferson, AR 72079-9502.

The therapeutic alkyl imidates, methyl acetimidate (MAI) and dimethyl adipimidate (DMA) induce perturbations in cell cycle progression and loss of cell viability in cultured human lymphocytes and Chinese hamster cells. Currently, the mechanism by which imidates exert these effects remains unknown. However, it is well established that mammalian cells die through either necrosis or apoptosis (programmed cell death) pathways which are biochemically and morphologically distinct from each other. Analysis of the cell cycle by flow cytometry (FCM) is an effective means of identifying phase-specific effects of a chemical. Experiments were conducted that addressed the mechanism of the antiproliferative and toxic effects of MAI and DMA in the human lymphoblastoid cell line, AHH-1 $tk^{+/-}$. Cell cycle analysis was performed by the BrdUrd/DNA FCM assay and recruitment of cells into the apoptosis pathways was quantified and validated by the viability/membrane permeability (FDA/PI) assay and TEM. Short term exposure of AHH-1 $tk^{+/-}$cells to the imidates profoundly alters the distribution of cells within the cell cycle. At equal concentrations, MAI is more toxic than DMA; the increase in toxicity appears to be due to a greater ability of MAI to recruit cells into pathways for apoptosis. (This research was funded by DOE and NCTR.)

THE EFFECTIVENESS OF COMMERCIAL SUNSCREENS IN PROTECTING SNAIL EMBRYOS FROM THE HARMFUL EFFECTS OF SHORTWAVE ULTRAVIOLET RADIATION. Ellen W. McLaughlin, Biology Department, Samford University, Birmingham, AL 35229

Freshwater snail embryos in cleavage stages were given a one time exposure to shortwave ultraviolet radiation (UV-C 254 nm) using a dosage (2000 J/m^2) known to reduce survival and increase abnormalities. Sunscreens with sun protection factors (SPF) of 15, 30 and 45 were uniformly smeared on a transparent surface (0.02 gm/64 cm^2) and interposed between the ultraviolet radiation source and the embryos. This was done in order to assess the effectiveness of sunscreens in preventing biological damage to dividing cells. Although the survival rate of embryos tested with sun screens SPF 30 and SPF 45 was similar to that of the controls (97% survival), the survival rate decreased to 75% with SPF 15 and for all three sunscreens the hatching rate decreased and abnormal development increased. It was concluded that these sunscreens were not effective in protecting against the harmful effects of UV-C radiation.

CARTER, JACQUELINE, GEORGE CLINE, JAMES RAYBURN, AND ROGER SAUTERER. Jacksonville State University. Jacksonville, AL 36265.
Sexual Dimorphism in *Terrapene carolina* and Four of Its Subspecies.

Terrapene carolina, is a terrestrial turtle that displays sexually dimorphic characteristics. Sexual dimorphism in plastron shape (concave in males and convex in females) and eye color during the breeding season (red in males and yellow in females) is well documented. During this study, 13 external morphological characters from nearly 700 individuals representing four subspecies of *Terrapene carolina* (*Terrapene carolina bauri*, *Terrapene carolina carolina*, *Terrapene carolina major*, and *Terrapene carolina triunguis*) were measured. Ten measurements were recorded from the carapace and plastron of each turtle. Three measurements were derived from the data (relative carapace height (RCH), relative carapace width (RCW), and relative plastron width (RPW)). Each measures the posterior portion of the shell relative to the anterior portion. In general, males were longer and wider than females, while females were taller than males based on absolute measures. The RCH value averaged −3.21 for females and −2.30 for males, thus females were relatively taller posteriorly than males, but males were relatively wider posteriorly than females (RCW). These data are also compared by sexes among the sub-species. Possible evolutionary implications are discussed.

GILBERT, JONATHAN, FRANK A. ROMANO, AND GEORGE R. CLINE. Biology Dept., Jacksonville State University, Jacksonville, AL -
The relationship of ghost crab, *Oycpode quadrata*, burrow diameter to distance from the debris tide line.

During the summer of 1998 ghost crabs, *Ocypode quadrata*, burrows and their relationship to the tidal debris line was studied on Dauphin Island, Al. The diameter of 222 active burrows and the distance from the debris line was collected from eight locations. The mean burrow diameter was 39.9mm, ranged from 9.1 – 86.1mm. The average distance from the debris line was 8.6 m and ranged from −4.1 – 55m. Thirty-two burrows were found below the debris line (towards the tide line) hence the negative numbers. These burrows averaged 17mm in diameter and ranged from 9 – 34mm. One hundred and ninety burrows were above the debris line and averaged 43.7mm and ranged from 13 – 86mm. This suggests that smaller animals are being confined below and larger ones exist above the debris line. A regression analysis of these data suggests there is an increase in burrow diameter with an increase in distance from the debris line but only 19% of the variance is explained by this relationship ($r^2 = 0.1896$). Further analysis must be done to establish causative factors.

COLD-TOLERANCE IN *Pseudomonas flourescens* 30-3 ISOLATED FROM OIL-CONTAMINATED SOIL IN ANTARCTICA.

Gitika Panicker and Asim K.Bej, Dept. of Biology, Univ. of Alabama at Birmingham, Al-35294-1170

Pseudomonas fluorescens 30-3 was isolated from oil-contaminated soil in Antarctica using m-toluate, as the sole carbon source. The cultures of *P. fluorescens* 30-3 exhibited tolerance to temperatures ranging from from -2^{0}C to 35^{0}C. The culture incubated at -2^{0}C demonstrated a relatively longer lag phase when compared to the culture grown at 22^{0}C, which is probably due to the slower metabolic rates at colder temperatures. PCR amplification of purified genomic DNA from *P. fluorescens* 30-3 using degenerate oligonucleotide primers that are specific for the gene coding for the cold shock protein generated a 160 bp DNA fragment. Nucleotide sequence analysis of the DNA fragment showed 97% homology with the *capB* from *Pseudomonas fragi* and 69% with the *cspA* from *Escherichia coli*. The expression of this gene and its role in cold tolerance in *P. fluorescens* 30-3 is currently being investigated. It was noted that the cells tend to aggregate to form distinctive clumps when grown in liquid media at cold temperatures. The cells were stained with fluorescent dyes using the Live/Dead BacLight™ Bacterial Viability Kit (Molecular Probes, Inc.) and shown to be viable. Hence, it is possible that this aggregation is a manifestation of a survival strategy adopted by this organism at cold temperatures. In the repeated freeze-thaw study, an increased survival was observed when the culture of *P. fluorescens* 30-3 was treated at 4^{0}C prior to freezing. Although *P. fluorescens* 30-3 exhibited tolerance to cold and sub-zero temperatures, the exact physiological and genetic mechanisms for growth, survival and biodegradative activity at cold temperatures is being investigated.

CHEMISTRY

CLEANING TITANIUM SURFACES: AN X-RAY PHOTOELECTRON STUDY

Beminet Gabre and Ebenezer Odeispie and Dr. Jeffery Weimer, Department of Chemistry, University of Alabama in Huntsville, Huntsville, Alabama, 35899

It is important to passivate materials used for artificial joints in order to make them biocompatible. This involves treatment of surfaces that are in direct contact with the biological environment. In order to understand how specific surface treatments affect titanium films for enhanced biocompatibility, oxidized films of titanium were characterized as a function of surface treatments. Treated and untreated surfaces were analyzed using X-ray photoelectron spectroscopy (XPS). XPS provides a means to determine chemical composition as well as the surface concentrations of elements present. It can also be used to determine bonding interactions and oxidation-state for most elements. In this study, XPS was employed to characterize the Carbon, Oxygen, Titanium, and Nitrogen peaks before and after treatment.

pH DEPENDENCE OF THE UV-VISIBLE SPECTROSCOPY OF p-DIMETHYLAMINOCINNAMIC ACID. Mike Pyrlik, Bryan Hutto and Steven E. Arnold, Department of Physical Sciences, Auburn University Montgomery, Montgomery, AL 36124

The properties of highly polar aromatic compounds are of interest due to the usefulness of such compounds in a variety of applications such as polarity probes and as potential nonlinear optical materials. The UV-visible absorption and fluorescence spectroscopic properties of the neutral, anionic and cationic forms of p-N,N-dimethylaminocinnamic acid were investigated. The absorption spectrum of the neutral species is strongly red shifted relative to that of the parent cinnamic acid. The absorption spectrum of the cation is similar to the spectrum of the parent cinnamic acid and the absorption spectrum of the anion is slightly blue shifted with respect to that of the neutral compound. These properties will be correlated with the assignments of transitions based on computational results. This research was partially supported by a grant from the Auburn University Montgomery Research Grant-In-Aid Program.

AB INITIO COMPUTATIONS OF THE STRUCTURE AND PROPERTIES OF p-N,N-DIMETHYLAMINOCINNAMIC ACID. Bryan Hutto and Steven E. Arnold, Department of Physical Sciences, Auburn University Montgomery, Montgomery, AL 36124

The properties of highly polar aromatic compounds are of interest due to the usefulness of such compounds in a variety of applications such as polarity probes and as potential nonlinear optical materials. The geometry and properties of p-N,N-dimethylaminocinnamic acid were calculated at the HF 6-31+G(d) level using the Gaussian 98 program. The optimized geometry of the neutral molecule is essentially completely planar. Electronic transitions from the ground state geometry were computed at the CIS 6-31+G(d) level and the ZINDO semiempirical level. The assignment of transitions and extent of charge transfer will be examined. This research was partially supported by a grant from the Auburn University Montgomery Research Grant-In-Aid Program. A grant of computer time from the Alabama Supercomputer Center is also hereby acknowledged.

A SURVEY OF ILLEGAL CHEMICAL ACTIVITIES IN THE MUSCLE SHOALS DISTRICT DURING THE 20TH CENTURY. Richard C. Sheridan, TVA (retired), 105 Terrace Street, Sheffield, AL 35660.

This paper reviews several illegal activities pertaining to chemistry in Colbert and Lauderdale Counties, Alabama, during the last century. Fraud and waste in the World War I construction of U. S. Nitrate Plant No. 2, production of moonshine whiskey, discharges of elemental phosphorus and mercury into the Tennessee River, air and ground pollution, production and sale of bogus antifreeze, and the operation of drug laboratories are the main topics discussed.

FABRICATION AND CHARACTERIZATION OF POLYMER/CLAY NANOCOMPOSITE MULTILAYERS. Xiaowu Fan and Rigoberto Advincula Department of Chemistry, University of Alabama at Birmingham, Birmingham, AL 35294-1240

In order to prepare planar substrates for polymerization with clay particles, we have used the procedure detailed by Kotov and coworkers to adsorbed and form multilayer clay particles as thin films. Positively charged polydiallyldimethyl ammonium chloride (PDADMAC), was found to bind strongly to the surface of anionic montmorrillonite platelets in aqueous dispersions. This can be done up to a saturation concentration beyond which reversible physisorption is expected to occur. Immersion of the substrate (glass, quartz, silicon-wafer, gold) into an aqueous solution of PDADMAC (0.05, 0.1,1 wt %) and rinsing with ultrapure water for 10 min resulted in the strong adsorption of the polymer on the substrate. Immersion of the PDADMAC coated substrate into an aqueous dispersion (dialyzed at concentrations of 0.05, 0.1,1 wt %) of montmorillonite clay particles and rinsing with ultrapure water for 10 min led to the adsorption of the platelets. Repeating the self-assembly steps for n number of times produced self-assembled polymer/clay composite films up to 5 pair layers. The structure of self-assembled films is being characterized by a variety of techniques: X-ray diffraction, X-ray reflectivity, AFM, SEM, and surface plasmon spectroscopic (SPS) measurements. The clay platelets form stacks upon adsorption to the polymer layer.

DESIGN OF WEAK ACID TITRATION EXPERIMENTS BY STOCHASTIC MODELING. M. B. Moeller, Department of Chemistry and Industrial Hygiene, University of North Alabama, Florence, AL 35632.

Estimating the precision that can be expected for an experimental procedure may be necessary for interpreting experimental results and is essential for optimizing an experimental design. In all but the simplest cases, the traditional propagation of errors technique expands to a challenging exercise in calculus. Stochastic modeling is an alternative method for providing valid precision estimates with relative ease. This paper presents two examples of precision analysis by stochastic modeling. In the first example, a spreadsheet that would ordinarily be constructed to record and process observations is modified to introduce random, normally distributed scatter to the data. Using a macro, the spreadsheet is then recalculated many times and the result for each trial recorded. Just as with an actual experiment, the experimental precision follows from the statistics obtained from the results of the simulated experiments. The second example requires slightly more elaborate modeling - the titration of a very weak acid, boric acid, by strong base. In this case, the stochastic modeling revealed the superiority of conductimetric titration for determining the equivalence point over a pH titration. The output from the computer simulations closely match the results obtained by our laboratory experiments with this system.

The Conformation of NaAD Bound to NAD-Synthetase Determined by Transferred Nuclear Overhauser Effect Spectroscopy. Yi-Chien Lee, Patricia Jackson, and Donald Muccio, Dept. of Chemistry, Univ. of Ala., Birmingham, AL 35294

NAD-Synthetase catalyzes the last step of the biosynthesis of nicotinamide adenine dinucleotide (NAD) from deamido nicotinamide adenine dinucleotide (NaAD), using the ATP. The conformations of enzyme-bound substrates are of interest for the understanding of the catalytic mechanism of the enzyme and the design of new inhibitors. NaAD bound to NAD-Synthetase is still unknown. From the one dimensional proton NMR titration, the exchange range of NaAD bound to NAD-Synthetase was the fast exchange. The transferred nuclear overhauser effect (TrNOESY) NMR spectroscopy is a good method to determine the structure of the bound NaAD. In the recent study the denosine and the deamido nicotinamide riboside of NaAD are both in the anti conformation about glycoside bond. The distances of each proton pair in NaAD will be determined from the NOE build-up curve. The simulated annealing will be allowed to determine the structure of NaAD bound to NAD-Synthetase with proton-pair distances constraints.

NATURAL PRODUCT INHIBITION STUDIES WITH NAD SYNTHETASE. Brandon S. Pybus, Dept. of Chemistry, Univ. of Ala. Birmingham, AL 35294. Erica R. Lawton, Dept. of Chemistry, Univ. of Tenn. Martin, TN. Christie G. Brouillette and Lawrence J. DeLucas, CBSE, Univ. of Ala. Birmingham, AL 35294. Donald D. Muccio, Dept. of Chemistry, Univ of Ala. Birmingham, AL 35294.

NAD synthetase, a member of the ATP pyrophosphatase family of enzymes, catalyzes the last step of the biosynthesis of nicotinamide adenine dinucleotide (NAD) from deamido nicotinamide adenine dinucleotide (NaAD), using the chemical energy in ATP.

$$MgATP + NaAD + NH_3 \leftrightharpoons NAD^+ + AMP + MgPPi$$

NAD Synthetase is considered a good drug target for possible antibacterial drugs. The X-ray crystal structure shows that the enzyme exists as a homodimer, consisting of 30 kDa subunits. From enzyme kinetic data, enzyme-substrate dissociation constants and interactivity constants between substrates were determined. Inhibition studies then were carried out with the natural products of this enzyme-mediated reaction. AMP displayed mixed (noncompetitive) type inhibition against all substrates as did PPi. This information reduced the total number of kinetic models from nineteen to five. Similar experiments are now under way with NAD^+. Together these data will help refine the choice of kinetic mechanism for NAD Synthetase and further our understanding of the enzyme.

THERMAL AND PHOTOCHEMICAL CONVERSION OF POLYMETHYLSILANE TO POLYCARBOSILANE. Mohammad R. Imam and Adriane G. Ludwick, Department of Chemistry, Tuskegee University, Tuskegee, AL 36088.

The use of chemical approaches to improve the processing, properties and performance of advanced ceramic materials is a rapidly growing area of research and development. One approach involves the preparation of silicon-containing polymer precursors and their controlled pyrolysis to ceramic materials. Of these organosilicon polymers, polycarbosilanes (PCS) are widely used as matrices and to prepare SiC fibers for ceramic matrix composites (CMC). In this present investigation the use of polymethylsilane (PMS) as a pyrolytic precursor to silicon carbide was examined. PMS was prepared by the reductive coupling reaction of methyldichlorosilane with sodium metal in toluene under nitrogen atmosphere. PMS was thermally and photochemically converted to PCS. The changes in the PMS structure were monitored by NMR, FTIR, UV and thermal analysis. The possibility of producing PCS at low temperature was examined as a part of the research. The usefulness of these polycarbosilanes in vacuum hot press processing for the development of silicon carbide ceramic blocks was explored. Mechanical testing and characterization of the fabricated blocks are in progress. Support of the NSF/CREST grant is acknowledged.

PHENOLIC RESINS: STRUCTURE PROPERTY RELATIONSHIPS. Ivy D. Bradford, Adriane G. Ludwick and Zhenyi Zhang, Chemistry Department, Tuskegee Univ., Tuskegee, AL 36083.

Phenolic resins with exceptional fire resistance properties are in continued demand for military and aerospace applications. Halogenated organic compounds exhibit good flame retardancy properties. Thus, incorporation of bromine into the network structure of the phenolic resin is expected to enhance the flame retardancy property of the system. The study of bromine-containing phenol/formaldehyde resins allows the exploration of useful new phenolic resins as well as insight into the chemistry of the complex reactions between phenol and formaldehyde and their intermediate products. In this work, various molar ratios (1:1 and 9:1) of resole type phenol-parabromophenol copolymer resins were synthesized and characterized. The resins were used in the processing of glass fiber reinforced composites. Thermal properties of the cured resoles were analyzed by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). Structural analyses of the resins by ^{13}C nuclear magnetic resonance (NMR) spectroscopy show several peaks in the C-Br region of both resoles suggesting primary bonds between the para-bromophenol and phenol methylol groups for these systems. TGA studies reveal that the 9:1 resole yields better thermal properties than the 1:1. The composites' microstructure properties will be examined using scanning electron microscopy (SEM). This research was funded by the Army Research Office (ARO).

PHOTO-INDUCED ALIGNMENT OF AZOBENZENE DYES IN POLYMER ULTRATHIN FILMS FABRICATED BY ALTERNATE POLYELECTROLYTE DEPOSITION: ALIGNMENT LAYERS AND FILM MORPHOLOGY. Mi-kyoung Park and Rigoberto Advincula Department of Chemistry, University of Alabama at Birmingham, Birmingham, AL 35294-1240

In this report, we describe the investigation of photo-induced alignment in ultrathin films consisting of azobenzene dyes and polyelectrolyte layers fabricated using the APD technique (or LAMSA). Such phenomena can find applications in LC displays, optical storage, biosensors, etc. The behavior of the chromophoric dye was investigated as it relates to layer ordering, dye aggregation, and film morphology. The molecular assembly was investigated by a number of surface sensitive techniques, i.e. including quartz crystal microbalance (QCM), ellipsometry, surface plasmon spectroscopy, and atomic force microscopy. Important, correlation was made on the film morphology and molecular ordering achieved using polarized UV-light to induce photo-alignment in a hybrid LC cell configuration. We observed that ordering achieved by photoisomerization is highly dependent to the "host" polyelectrolyte. Several potential device configurations are outlined.

EARTH SCIENCE

FREE PRODUCT RECOVERY, A SUCCESS STORY? Daniel J. O'Donnell, PG, O'Donnell & Associates, One Office park, Suite 404D, Mobile, Alabama 36609

Since the late 1980's, leaking underground storage tanks have been the focus of attention for many state regulatory agencies. In the early 1990's, the Iowa Department of natural Resources, in an effort to bring underground storage tank owners into the state tank trust fund, required owners to evaluate their tank sites for leaks within a specific timeframe. Completion of the evaluation by the mandated deadline, allowed the owners to have environmental work associated a release to be covered by the state clean-up fund. A result of the state deadline was that the regulatory agency was overwhelmed with hundreds of "new" releases over a very short period. One particular site, found to have several feet of free gasoline present on the aquifer below it, was evaluated and outfitted with a free product recovery system that removed gasoline from the aquifer at a rate of 15 gallons per hour. Unfortunately, the remarkably efficient recovery operation was not aggressively pushed by the IDNR and soon, with the crush of new sites identified through insurance borings, was it was lost in the system. Eight years later, the site continues to have several feet of gasoline present on the aquifer and the remedial effort has deteriorated to bailing minor quantities of product twice per month.

A YEAR BY YEAR SEDIMENTATION RECORD WITHIN WEEKS BAY BALDWIN COUNTY, ALABAMA. M. Gattwood, D Young, D Haywick, A. Fisher and D. Allison, Depart. of Earth Sciences, University of South Alabama, Mobile, AL 36688

Weeks Bay is a small estuary (c. 7 km^2) located in southern Baldwin County approximately 30 km south-east of Mobile, Alabama. Between December 1997 and January 1998, we collected 401 sediment grab samples from the bay floor. The upper 2 cm from each sample was extracted and processed for grain size distribution via the pipette and sieve method of analysis. These grain size data, as well as sample location co-ordinates as determined using GPS, were transferred to base maps of Weeks Bay, digitized using AutoCAD Map GIS R14 and used to produce a grain size distribution map of the estuary. The following year (January to February 1999), over 660 new samples were collected and processed to produce a second grain size distribution map of Weeks Bay. Differences in grain size between the two years were identified and plotted onto a third base map.

We now have a record of bottom sediment in Weeks Bay spanning two years and have observed subtle, but nevertheless important shifts in sediment distribution in this estuary. Some changes (e.g., increased sand deposition and expansion of sand bars at the mouths of rivers), may be due to enhanced up-river erosion of farm lands and construction sites. Other changes have been attributed to specific events such as hurricanes and/or floods. By tracking bottom sediment in Weeks Bay, we can rapidly determine sediment distribution changes and possible sedimentation "problem" areas within the embayment. These data will provide useful information by which to formulate management plans for environmental and conservation agencies.

A DIGITAL REGIONAL GEOLOGIC MAP OF THE NORTHERN ALABAMA PIEDMONT CONSTRUCTED WITH GIS. David T. Allison, Dept. of Earth Sciences, University of South Alabama, Mobile, AL 36688

Recent knowledge gained from a program of converting mapping data to digital geologic maps has demonstrated that GIS is superior to traditional methods of producing geologic maps. This study draws on mapping within the Blue Ridge of Alabama, a terrane composed of Neoproterozoic metaclastic and metavolcanic rocks intruded by Paleozoic granitoid plutons. The terrane is polydeformed by Acadian and Alleghenian tectonic pulses, presenting the full gamut of geologic mapping problems that must be addressed by GIS software. Each data station may contain S1, L1, F1-F4, or axial surface orientation data that must be oriented on the map with dip/plunge attributes attached. Linework representing contacts on the final map include regional unconformities, thrust duplexes, and late normal faults. The GIS solves these traditional mapping problems by: (1) treating outcrop area as "intelligent" polygons that "know" their identity, (2) allowing queries on the polygon topology that assigns properties such as color or pattern based on lithologic code, (3) integrating traditional geological database information, such as lithologic descriptions or scanned photographs, with graphical station markers on the map, (4) posting oriented structure symbol markers with attached dip or plunge attributes from database tables, (5) generating line type patterns based on contact type classification, and (6) performing topology queries that, for example, could update the lithologic classification field of a station database table based on the lithologic class of the container polygon.

GEOGRAPHY, FORESTRY, CONSERVATION AND PLANNING

LOUISE KREHER FOREST ECOLOGY PRESERVE. Wilbur B. De Vall, President, Proxy Services, Ltd., Auburn, AL 36830.

A forested, 115-acre tract of an original home site is being developed as a 'preserve' for the purpose of providing an outdoor laboratory for students where research in the field of biology can be conducted. The forest has been used for studies of birds, wildflowers, photography, weather, insects, reptiles, soils, and orienteering. In addition, it offers volunteers an opportunity for service while creating an appreciation for stewardship of the forest resource by users and encouragment to develop an ecological awareness. It is being developed as an endowment and has been donated to the Auburn University Foundation, to establish and maintain in perpetuity the Forest Ecology Preserve, and to be administered by the School of Forestry and Wildlife Sciences. The property has been surveyed by a licensed surveyor for the purpose of laying out roads and trails. A Global Positioning System (GPS) has been established and markers provide bench marks for the location of 100 species of plants. The number of species selected was in recognition of the 100th anniversary of the Society of American Foresters (SAF), established in 1900, and from which a grant was received. The War Eagle Chapter of the SAF is using the money to construct kiosks, trail signs, species markers, and other signage to facilitate public access and to encourage learning. Local volunteers perform maintenance duties and assist with programming. Organizations and agencies having contributed time, materials, or funds include Partners In Preservation (Red Lobster), Sierra Club, Auburn City Beautification Council, Master Gardners, and the Alabama Department of Transportation. Programs for the public are scheduled throughout the year and emphasize seasonal changes in the environment.

"THE LAW" AS A BASIS FOR TEACHING PLANNING THEORY AND PRACTICE.
William K. McAllister, Department of Community Planning and Urban Studies, Alabama A & M University, Huntsville.

Knowledge of the applicable legal basis of urban planning can provide an important vehicle for teaching planning concepts. The Planning Accreditation Board (PAB), the sole accreditation body for urban planning education in the U. S., requires legal concepts to be addressed in the core curriculum. Many planners begin their career in a public agency that typically includes functions like reviewing subdivision plats for compliance with the laws, and making recommendations on zoning requests. Knowledge of land use law allows planners to intelligently discuss land use regulatory practices with legal advisors. For planning educators, teaching the legal basis of planning is a window through which much of planning theory and practice can be viewed and perhaps merged. The vehicle for these discussions is the dynamic area of case law. Here the courts present a set of rational arguments that can be very helpful to the planning student as well as the practitioner. Studying selected court decisions allows the student to focus on a particular concept, such as that of achieving a balance between private property rights and the public interest. Through written case analyses, students examine key facts, both sides of the main issues, reasons for the decision, and implications of the decision for planning practice. Readings in a Cases and Materials book help connect court decisions to broader land use planning principles. The analysis of actual decisions that affect planning practice helps students focus attention on basic issues such as equal protection of the law (housing opportunity for all), freedom of speech (sign controls), and delegation of powers (state to local government enabling laws). The result can be a student grounded in both theory and practice, with some understanding of the connecting links.

PHYSICS AND MATHEMATICS

WAVEFUNCTIONS OF A WATER MOLECULE IN LANTHANUM ZINC DOUBLE NITRATE. Henry Glotfelty, Department of Physics, Samford University, Birmingham, Alabama, 35229.

^{17}O electric quadrupole parameters of the water molecules in the X and Y sites of a Manganese doped Lanthanum Zinc Double Nitrate (Mn:LaZnDN) crystal have been determined from an Electron-Nuclear Double Resonance (ENDOR) investigation. The ^{17}O electric quadrupole coupling constants for the OW1, OW2, and OW3 water molecules were found to be 7.56(4) MHz, 7.44(7) MHz, and 7.24(4) MHz, respectively. The asymmetry parameters were found to be .78 (2), .82(2), and .81(2), respectively. It was found that for all three water molecules the principal axis of the largest principal value is perpendicular to the plane of the water molecule, and the axis of the most negative principal value is parallel to the proton- proton direction. The effect of the geometric distortions of the three water molecules on the molecular wavefunctions and on the electric quadrupole will be explored and discussed.

ON TIME INVARIANT SYSTEMS. Sergey Belyi, Dept. of Mathematics & Physics, Troy State University, Troy, AL 36082.

Realization theory of different classes of operator-valued (matrix) functions as transfer operator-valued functions of linear time-invariant systems plays an important and essential role in modern operator theory, system theory, control theory, electrical engineering, interpolation problems, and scattering theory. Almost all realization problems in the modern theory of non-selfadjoint operators and its applications deal with systems the main operator of which is a *bounded* linear operator. The case with an *unbounded non-selfadjoint* operator as a main operator in a corresponding time invariant system has not been investigated sufficiently because of a number of essential difficulties usually related to unbounded operators (especially non-selfadjoint ones). Using methods of functional analysis and operator theory we classify transfer mappings of time-invariant systems. A problem when the product of two transfer operator-valued functions from selected class belongs to the same (or another) class is investigated. To prove the multiplication theorems in each subclass we generalize the concept of a product of two systems. Latter is an unbounded version of the operator colligations product first introduced by Brodskii and Livsic.

REPRESENTATION OF ZETA AND MÖBIUS FUNCTIONS AS TENSOR PRODUCTS OF MATRICES. Bruce W. Atkinson, Dept. of Math. and Comp. Sc., Samford Univ., Birmingham, AL 35229

Let S be a finite set with n elements. For A and B subsets of S, define $\zeta(A, B) = 1$ if A is a subset of B, and $= 0$ otherwise. ζ is called the zeta function of the power set of S. Next, enumerate the elements of S and then, in the usual way, identify each subset of S with an n-tuple of 0's and 1's. Viewing these n-tuples as binary numerals, we may order the subsets of S in binary order. Let $Z(n)$ be the matrix representation of the zeta function using this binary ordering of the subsets. It is shown that $Z(n)$ is the nth tensor power of the 2 by 2 matrix $Z(1)$. (Recall that if $C = (c_{ij})$ is an m by r matrix and D is a p by q matrix, then the tensor product of C and D is the mp by rq matrix consisting of an m by r block array of p by q blocks where the ij block is $c_{ij} D$.) The inverse of the zeta function is called the möbius function of the power set of S. Let $M(n)$ be the inverse of $Z(n)$. It is shown that $M(n)$ is the nth tensor power of $M(1)$. These tensor power results can be applied to an algorithm to generate arbitrary binary functions in the area of binary neural networks. Also, if the matrices $Z(n)$ are viewed as raster arrays of black and white squares scaled to fit in the unit square, then the classical Sierpinski triangle is the limit of $Z(n)$, using the Hausdorff metric. Other fractals will be considered that can similarly be obtained using tensor products of matrices.

MATHEMATICA USES IN INTRODUCTORY PHYSICS COURSES. Alan D. Hargrave, Department of Physics, Samford University, Birmingham, AL 35229.

The traditional introductory Physics course relies heavily on end-of-chapter problems that are assigned to students as a part of their learning experience. Most textbooks contain sample problems that serve as a starting place for student exercises. This often leads to a cookbook approach to problem solving (and learning in general) where there is little understanding of the underlying principles involved. This is especially true where a thorough understanding requires several calculations and only a few are preformed due to limits of time or complexity. Until recently, it was sometimes difficult to convey certain principles because of the inability to satisfy the computational and graphic needs for effective presentation. Mathematica® provides a powerful tool that can be used to demonstrate many principles by performing mathematically intensive calculations and readily displaying the results in convenient graphic formats. With the power available in today's standard personal computer, significant calculations can be performed as a part of a classroom demonstration. This presentation will give calculation examples that are particularly suited to introductory physics courses. Several graphic formats that are well suited for displaying physical data are also explored.

BULK CRYSTAL GROWTH OF NONLINEAR OPTICAL L-ARGININE TETRAFLUOROBORATE CRYSTALS*. C. Owens, K.Bhat, W.S. Wang, R.B. Lal and M.D. Aggarwal Department of Physics, Alabama A&M University, Normal, AL 35762.

In an effort to find new thermally stable nonlinear optical materials, a series of aminoacid derivatives of tetrafluoroborates were synthesized. L-Arginine tetrafluoroborate crystalline powder showed promising nonlinear optical properties. Bulk single crystals of L-arginine tetrafluoroborate a semiorganic nonlinear optical mateial have been successfully grown from aqueous solution using temperature lowering technique. In order to determine the best solvent, solubility of this material in various solvents such as ethanol, methanol, acetone and water were studied. Water was found to be the best solvent and high quality large size crystals of L-arginine tetrafluoroborate have been grown using solution growth technique. Initial characterization of the grown crystal has been carried and results of solubility studies and other crystal growth parameters will be presented.

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CONFORMAL FLUCTUATIONS OF THE INTERIOR SCHWARZSCHILD SOLUTION. Govind K. Menon, Dept. of Mathematics and Physics, Troy State University, Troy, AL 36082.

After developing a master propagator for Conformal Quantum Fluctuations, the time development of the gravitational wave function for the interior Schwarzschild solution is considered. The effect of the two classical singularities (/ pseudo-singularities) of the Schwarzschild solution on the quantum wave function for the gravitational field is studied using a wave function initially localized on the classical solution. While the true singularity at $r = 0$ imparts consequences on the wave function that cannot be ignored, the pseudo-singularity at the event horizon does not seem to cause any divergences on the interior fluctuations of the Schwarzschild solution.

INDUSTRY AND ECONOMICS

SCHOOL CHILDREN VS. PRISONERS: THE BATTLE FOR PUBLIC FUNDING
Marvin Adcock and Eric Rahimian, Department of Economics, Finance and OSM, Alabama A&M University, Normal, Alabama 35762

This paper attempts to examine whether increases in correctional system funding come at the expense of public education. Data were examined for several variables including correctional populations, correctional expenditures, correctional facilities construction, public school expenditures and student test scores as demonstrated by analysis of international test scores in mathematics and science. We had 28 observations from 1971 to 1998. The data demonstrate public school funding of elementary through colleges and universities have increased by a small fraction in comparison to correctional system spending. Correctional expenditures during this period increased over five folds, primarily because of increases in prison populations. Crime rates have decreased in the last decade due to the booming economy and enforcement of stricter criminal penal laws. The most notable reason for the sharp increase in prison expenditure is an increased public fear of violent victimization and infatuation with locking up all criminal offenders. The alternative is to solve societal ills related to disenfranchisement of some groups that were left out of the economic prosperity of the 1990's. During the last three decades little attention was paid to the declining American public education infrastructure with its crumbling schoolhouses, inadequate teaching resources and crowded classrooms. On the other hand focus was placed on incarcerating the very citizens who were victimized by the inadequate public education system. Today many American schools are older than prisons used to incarcerate state and federal prisoners. The average age of most U.S. schools is over forty years while that of prisons is far less. We believe it is necessary to rethink our national and state public funding policy. To allocate more funding to public education may indeed significantly reduce the crime rate and the need for prisons.

POVERTY AMID AFFLUENCE IN ALABAMA, Eric Rahimian and Fesseha Gebremikael, Department of Economics, Finance and OSM, Alabama A&M University, Normal, AL 35762

During the last decade, the United States experienced the longest economic expansion in its history. This great period, however, has not brought prosperity to all its citizens. High poverty rates persist in many inner cities, counties and rural areas, and particularly in areas inhabited by minorities. To shed light on the causes of poverty, we have studied the official poverty line and have examined the most recent income and poverty data reported by the Census Bureau. These data are grouped under different classifications including age, race, and other socioeconomic factors such as households' composition and geographic location. We have observed a positive relationship between the poverty rate and the social and behavioral problems. Some writers have blamed the poverty of communities on social behaviors such as drug use, crime and illegitimacy. In our view, the main causes of poverty are poor education, low income and lack of opportunity. To this effect, we have examined the county per capita income data of the last decade for Alabama, published by the Bureau of Economic Analysis. These data show large disparities in income per capita among the counties. Although the nominal per capita income for all counties in Alabama has increased, the range of the data has not decreased. Examining the county poverty rates, again we observe large disparities, indicating that poverty rate in certain counties, particularly in ten counties in the Black Belt, has remained high with an even higher poverty rate for children. We have concluded that Alabama should tailor its poverty policy to its county-level conditions. Poverty lines for rural and metropolitan areas must be based on area-specific cost-of-living index. Finally, better education and training of the poor can enable them to get better jobs and move out of poverty.

The "New Economy." James G. Alexander, Alabama A&M University and Paulette S. Alexander, University of North Alabama.

There was a popular song of the 1960s which had a line something like this: "...something's happening here, what it is ain't exactly clear..." One more time now. Though not the subject of the song, one of the defining phenomena of the 1960s was its "new economics" entailing, at least prospectively, ongoing economic prosperity and growth. This hope, after a long lull, has re-emerged under the similar label of the "new economy." While there is substantial vagueness about the specifications of the new economy, its existence and importance are pervasively proclaimed. Indeed, that "what it is ain't exactly clear" adds to its pervasiveness, as parsimony of exposition leaves almost everyone an opportunity to embrace it. Long expansions, rising productivity, technological impetus, price discipline, competitiveness, sectoral shifts, stock market rotation and more—there are many handles to attach to. In a basic way, the economy is continuously re-invented and pushed along in this re-invention process by technological advances. This is straightforward Veblen-Ayres institutionalism. But while there is historical continuity to economic progress, it does often come in fits and starts as Schumpeter emphasized. The recurring new economy theme might well be interpreted in this context. Reminders of precedence need not curtail awareness of, or even enthusiasm for, contemporary developments. Nevertheless, they can provide useful and perhaps even instructive perspective. The present paper explores some of the aspects and ramifications of the "new economy."

MOTIVATING INTRODUCTORY ACCOUNTING STUDENTS TO MAJOR IN ACCOUNTING. Rohit Jain & Helen Gabre, Department of Accounting, Alabama A&M University, Normal, AL 35762.

All business majors are required to take Principles of Accounting courses as part of the business core. The majority of students in these classes are still in the process of deciding their major of choice in the business area. These students need useful information to enable them to make this crucial decision. Teachers in Principles courses can play an important role in influencing the decision of these students.

The paper presents several techniques that may be used to motivate students, including the following: Professors in principles courses should inform students about the benefits of a career in accounting, describe the different areas of specialization in the field, and the possibilities of becoming a CPA. Previous accounting graduates who are currently working may be invited to classrooms to give information to these prospective majors. Encouraging attendance and membership in accounting clubs on campus helps create an interest in the profession. A coordinated effort between the community and the accounting department to offer cooperative programs and internships to students in accounting is also important. Finally, offering scholarships to accounting majors can entice many good business students into considering accounting as their field of choice.

What of E-Commerce? James G. Alexander, Alabama A&M University and Paulette S. Alexander, University of North Alabama.

Economic logic posits that the importance of exchange derives primarily from the efficiency advantages of specialized production processes and patterns. In an economy that emphasizes self-sufficient production, with each person or small group directly provisioning themselves to meet their own needs, exchange, though present, is of limited occurrence and importance. But once specialization in production—and thereby greatly increased interdependence in life—develops, exchange becomes a central concern of economic analysis. Thus it was that the notion of a market system was in significant measure a product of the Industrial Revolution. New production techniques and arrangements led to dramatic increases in efficiency and output. These same developments added greatly to interpersonal and inter-group dependence due to the widening mismatch between the locus of production and that of consumption. In order to realize the benefits of the increased output, it was increasingly necessary to move the goods in terms of both place and ownership. A rapidly developing commercial revolution of the late twentieth century may affect production and other economic arrangements much as the production revolution of the late eighteenth century affected commercial arrangements. The potential of e-commerce is indicated by the substantial (in some cases enormous) corporate market values assigned to businesses yet to become profitable. Few observers fail to recognize that e-commerce has tremendous potential. While land-based commerce remains overwhelmingly dominant, net-based commerce is expanding rapidly. Perhaps even more important than the sheer volume of trade, this prospective transformation in transactional mode can be expected to alter both the way customers shop and the way producers sell. Moreover, new consumer behavior patterns and business models are likely to be joined by changes in the spatial arrangements of businesses, taxation and intergovernmental relations, practices of land-based enterprises, complexities of property rights and contract enforcement, means of payment, the consumption (and saving) function, degrees of competition, and price levels and movements.

LONG-TERM HEALTH CARE AND FINANCIAL SECURITY. **Paul J. Holley and T. Morris Jones, College of Business, University of North Alabama.**

Society's prospective of financial security has changed considerably over the last few years. For example, families have purchased for many decades all sorts of insurance (life, health, disability, auto, home and burial) but have failed to make provision for long-term care of family members whatever their age. In some situations, failure to provide for long-term care has been disastrous from a financial standpoint. The present research focuses on several aspects of long-term care including: (1) adult daycare centers, (2) home health providers, (3) assisted living facilities and (4) nursing homes. Since there is a 50 percent chance or better that a family member will need one or more of these four services, then many families in the mid-range of income should make some provision for long-term care.

ACCOUNTING THEORY — DO WE NEED ONE? Sekhar Anantharaman, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

The paper seeks to assess over three decades of literature regarding the presence or lack thereof of a theory in accounting, and to answer the important question of whether we really need one. A theory's success as a theory depends on its value to users in explaining and predicting events. As of now there is not one theory in accounting that can be called "The Accounting Theory," as no one theory can currently explain and/or successfully predict all accounting phenomena. However, the paper does take into account the potential value of the positive theory of accounting and its limitations. Finally, the paper attempts to assess the need for an accounting theory and to determine whether we need one.

DEFERRED TAXES — A COMMENTARY. Sekhar Anantharaman, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

The purpose of this paper is to discuss "deferred taxes". The challenge when discussing taxes is to review the most current and relevant information. The tax laws are constantly changing. Legislators may argue that the rational behind these changing laws is mainly to provide for tax breaks for taxpayers and businesses across the economic and political strata. Another reason cited for change is to provide better clarity and understanding of the various tax laws and mandates. Still many hold the view that only certain groups benefit from these changes and that the changes themselves lend to more complexity in interpretation and implementation. In an effort to provide a meaningful commentary on the topic of "deferred taxes," the paper includes various extracts of relevant deferred tax interpretations and legislations.

TAX COMPLIANCE ISSUES FOR TELEPHONE COOPERATIVES. Sekhar Anantharaman, and Tyler Pair, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

Unlike regular corporations, most telephone cooperatives have historically been exempt from paying federal income taxes. However, during the past few years, the Internal Revenue Service (IRS) has attempted to tap into these "tax-exempt" companies. Although the efforts of the IRS have been only marginally successful, cooperatives, nonetheless, are becoming "taxable cooperatives." From Section 501(c)(12) of the code, a cooperative must maintain a minimum of 85% of its total revenue derived from members to continue being a tax-exempt company. This is the area that is causing the most problems for cooperatives, mainly because cooperatives are creating subsidiaries or other business ventures, which in the eyes of the IRS are not considered "member-sourced" income. When they factor the revenues from these investments into the formula, cooperatives are failing the 85/15 test.

If a cooperative becomes "taxable" it is suddenly faced with tax issues and planning decisions in relation to changing from a nontaxable to a taxable entity. Cooperatives faced with the problem of becoming taxable need to be careful in planning for their future as a taxable entity. Issues such as the position taken and the elections made during the first income tax return year will affect their tax liability in the years to come.

This paper will focus on various issues that "taxable" telephone cooperatives will face. The paper will include discussion on issues concerning *depreciable bases and depreciation methods, net operating losses/excess deductions, and tax elections.*

CREDIT CARDS AND COLLEGE STUDENTS: THE CARROT AND THE STICK. Eric Rahimian and Marvin Adcock, Dept. of Economics, Finance and OSM, Alabama A&M University, Normal, AL 35762

As a society, we have increasingly become credit card dependent. Portability, ease of use, reduced need for cash, and monthly settlements by check are some of the advantages of credit cards. On the other hand, forgetting how much the card is used, likelihood of inability to retire the debt, credit card theft and fraud, and high interest rates are some of the disadvantages. College students, like others, are attracted to the credit cards. In this paper, we have reviewed the recent literature on college student credit cards and their use on campuses. They often tarnish the credit records of the students who do not understand the long-term impact of poor credit records. The affected students go through stress and financial distress. To supplement the literature, we collected and analyzed primary data from students at Alabama A&M University. Using 71 observations, we examined the relationship between the credit card balance, interest rate charged, minimum monthly payment, and how long the card was held. The average credit card balance was $2,354. The average interest rate was 13.58%. The relationship between the interest rate and the student's debt balance is weak, an indication of no choice or lack of care. There is an inverse relationship between the interest rate and how long the card was held, implying recent cards have higher rates. Overall, we recommend early education of freshmen about the impact of high interest rates and the credit trap. Colleges and universities must also accept some responsibility in monitoring the frequency and timing of marketing activities of credit card companies on their campuses.

TEACHING THE NEED FOR SOFTWARE QUALITY TO CIS MAJORS. William A. Hailey, University of North Alabama, College of Business, University of North Alabama

Commercial software has been available for forty years. For almost the same length of time, systems analysis and design methods have been suggested for achieving high quality software. Still, there are numerous examples of poor quality being offered to end users by the top software companies. Given that top companies have quality problems, one can only wonder about problems in software produced by the lesser-ranked software firms and within corporate America. Our college software texts and systems books suggest extensive testing, CASE tools, and reviews or audits to control quality. This is a focus on the process. Most of the emphasis is on learning commands and syntax and solving problems. More attention could/should be given to insure programmers understand the need for and are motivated for quality. Instructors must search outside to find these needed concepts and methods. This paper researches the current status of software quality and offers suggestions for instilling the need for software quality within CIS majors.

MANAGEMENT ACCOUNTING SYSTEMS USED IN HUNTSVILLE FIRMS – A SURVEY. Rohit Jain and Eric Ohene-Nyako, Department of Accounting, Alabama A&M University, Normal, AL 35762.

Huntsville, a medium size city of about 200,000 people, is a high tech town situated in northern Alabama. NASA and Redstone Arsenal are located in Huntsville. Due to their influence, a wide variety of high-tech manufacturing and service industries have become established in Huntsville. This paper is a survey of the management accounting systems used by local firms. The data was collected mainly by graduate and undergraduate accounting students at AAMU. A variety of costing and AIS systems found to be in use in Huntsville are discussed in the paper.

ABC COSTING SYSTEMS IN SERVICE INDUSTRIES. Rohit Jain & Bonnie Banks, Department of Accounting, Alabama A&M University, Normal, AL 35762.

The application of Activity Based Costing (ABC) systems to manufacturing firms has been widely discussed in the literature. This paper evaluates the application of ABC systems to service firms, with an emphasis on the use of ABC in hospitals.

ABC can be a valuable tool for allocating overhead costs in service firms such as airlines, insurance companies, banks, hospitals, financial services firms and hotels. The problems and advantages of using ABC systems along with the problems of implementation are discussed first. Then, the suitability of ABC for hospitals is evaluated. ABC is found to be useful for many service organizations.

The Economic Status of the Black Population in Alabama: 1980-1990. Bernen Barks, Teshome Gabre and Constance J. Wilson, Dept. of Community Planning and Urban Studies, Alabama A&M University, Normal, Al 35762.

The economic profile of Black Alabamian has been intrinsically linked to the socio-political culture of the state. Historically the agrarian structure of the state's economy was highly dependent on the work of Black Alabamians. The on-set of technological advances in the early 1900s and the social change of the 1960s catalyzed both geographic and economic change for Black Alabamians. This study profiles the economic characteristics of the Black Alabama population. The data was compiled and analyzed from 1980 and 1990 from the Social and Economic Characteristics Census of Alabama, Statistical Abstract of the United States (1998). The study presents an analysis and comparison for the census years 1980 and 1990 for the following variables: black civilian labor force participation rate by gender; unemployment rate; occupations of employed black Alabamians; employed persons 16 years old and older by industry; Black household income; black families below poverty level; median family and household income. Each of these variables is statistically compared with the White population in Alabama. The findings reveal that there continues to be significant disparity between the economic conditions of Black Alabamians and Whites in the state. The disparity is sustained principally by the low average household income of Blacks. Which is principally attributable to the lack of representation of blacks in professional and skilled labor jobs.

The Welfare Continuum. James G. Alexander, Alabama A&M University and Paulette S. Alexander, University of North Alabama.

The contemporary American mindset is one of impatience and progress: it is oriented to checking things off the list. The process is: identify the problem, find the solution, end of story, next item. But reality is not quite so linear. For many, the fact that welfare was "reformed" in 1996 provided an "end of story," but it might much better be understood as "end of chapter." The economic concept of welfare relates to the human phenomenon of well-being. While "welfare economics" centers attention on no single group, the "economics of welfare" is directed particularly at groups whose well-being is subject to special danger. The history of the programmatic welfare policy reflects the changing circumstances and perceptions of danger. In the 1930s the overwhelming concern was one of economic insecurity. Thus, the policy orientation of government was in this direction: Social Security. This focus concentrated on filling gaps of lost income due to old age, disability, unemployment, and death. The "welfare" (in the popular vernacular) component of this approach was the Aid to Dependent Children (ADC), Aid to Families with Dependent Children (AFDC), Temporary Assistance to Needy Families (TANF) line. The "welfare reconstruction" of the 1960s was differently premised: in a period of prosperity rather than depression, concern was more with those systematically left behind than with those suffering a decline of economic circumstance. Emphasis was shifted from matters of economic insecurity to those of economic disadvantage. The 1990s version of welfare reconstruction or reform largely lost sight of the basic concept of well-heing and focused on being well. That is, the underlying construct was one of those in need of help are those in need of change. Neither insecurity nor poverty was central; instead, emphasis was on self-reliance. Shock therapy has its place, and some on "welfare" no doubt needed it—but for many it was entirely inappropriate. The concept of self-reliance as a substitute for taking care of those in need simply makes no sense in many cases; there are those who require assistance and denial of it is a basic repudiation of the concept of civilization. Therefore, the question to be focused on now is one of constructing the next stage. As an abstraction, it is evident that some former "welfare" dependents can move beyond this dependency and join the economic mainstream. But it is just as evident that others can do so only with special assistance, and some not at all. Once again, one size does not actually fit all. The premise of this paper is that the welfare reform process is a continuum, not an accomplishment. Whatever the merits or demerits of the 1996 welfare reform legislation, this is not the end of the story. This paper examines the U.S. welfare system and seeks to provide a historical perspective for understanding its current state.

SCIENCE EDUCATION

MINORITY PROGRAMS FOR SCIENCE, ENGINEERING AND MATHEMATICS STUDENTS AT A MAJORITY INSTITUTION. Adriel D. Johnson, Sr., Department of Biological Sciences, University of Alabama in Huntsville, Huntsville, Alabama 35899.

As we ended the last century, some emphasis was placed on preparing minority students in higher education for the technological oriented society of the new millennium. In 1988, it was projected by the U.S. Bureau of the Census that the minority school-age population in the United States would be 33% by the year 2000 and 40% by the year 2020. These projections would suggest potential for increased enrollments of minority students at both historically black colleges and universities and also majority white institutions. The National Science Foundation established two newly named projects during the end of the last century, the Alliances for Minority Participation and the Minority Graduate Education programs. In Alabama, several HBCU's and majority white institutions have formed alliances through these programs in an effort to increase the number of individuals from underrepresented minority groups receiving baccalaureate and doctoral degrees in science, engineering, and mathematics. At the University of Alabama in Huntsville, these programs have had an impact on retention, graduation rates, data analysis, communication, mentoring, research experiences and student resources. There are factors at HBCU's versus majority white institutions that create imbalances for minorities attempting to achieve academic goals. Collaborations involving higher education, industry and the private sector will be necessary for minority students in higher education to successfully compete in our dramatically changing science and technological society.

SETI: TEACHING SCIENCE WITH A SINGLE EQUATION. Dail W. Mullins, Jr., Dept. of Curriculum & Instruction and University Honors Program, University of Alabama at Birmingham, Birmingham, AL 35294.

During two recent non-consecutive summer terms I developed and taught a one-semester, three credit-hour undergraduate Honors seminar on the subject of "SETI: The Search for Extraterrestrial Intelligence." The course was cross-listed as an elective seminar both in the University Honors Program and in secondary science education. As a general focus for the course content I used the variables in the now famous Drake Equation ($N = R^{*} \times f_p \times n_e \times f_l \times f_i \times f_c \times L$), prefaced with an historical introducation to the topic of SETI and closing with an open class discussion of the provocative ideas advanced in Carl Sagan's novel *Contact* and the complementary notions of Timothy Ferris in his book, *The Mind's Sky*. Mainly because of the Drake Equation, I have found the topic of SETI to be an extraordinarily useful pedagogical vehicle for introducing students—primarily non-science majors, but also undergraduate secondary science education majors—to a wide variety of science topics and concepts, all within the framework of a theme which most find irresistibly fascinating: thepossibility of intelligent life on other planets. My experience has been that most students are more or less "attuned" to the topic, perhaps because of the popularity among many young people of the literary and cinematic genres of fantasy and science fiction.

CAN TECHNOLOGY ENHANCE STUDENT LEARNING IN A MIDDLE SCHOOL SCIENCE CLASS? Bonita F. Williams and Joseph George, Dept of Curriculum and Instruction, Columbus State University, Columbus, GA 31907.

A professor of middle level education and an eighth grade science teacher, along with her student teacher, received a mini-grant from the Co-Reform in West Central Georgia Transforming Teacher Education Project to explore ways to improve teacher education in order to improve student achievement. Each of the three is participating in Georgia's Framework for INtegrating TECHnology (INTECH) INTECH is a 50-hour professional development project that provides interactive modeling of effective technology-based strategies designed to support and enhance curriculum while providing a catalyst for change in teaching and learning processes. Originally developed for in-service teachers and then extended to student teachers, the model is currently being used to train its first group of college professors under the collaborative triad model. INTECH focuses upon developing skills in five critical areas: 1) use of technology, 2) curriculum integration, 3) designs for learning, 4) enhanced pedagogy, and 5) classroom management. Preliminary survey, interview, and observation data indicate that implementation of INTECH strategies has had a positive impact upon student attitude and achievement. Implications for and impact upon teaching and learning at the university level continues to be investigated.

THE HUMAN ODYSSEY PROGRAM AT AUBURN UNIVERSITY. J.T. Bradley, Department of Biological Sciences, College of Science and Mathematics, Auburn University, AL 36849 (bradljt@auburn.edu)

The Human Odyssey Program at Auburn Univesity aims to help students and faculty bridge the gap between science and the humanities that was described by Lord C.P. Snow in his 1959 essay "The Two Cultures". The program consists of two 3-hour semester courses that satisfy the core curriculum requirement in world history at Auburn University. These courses are unique for their high faculty:student ratio, small size, and participatory nature. Two professors, one humanities person and one scientist, are in each classroom of 25-30 students at all times. Students are assigned weekly readings in an anthology including book chapters, journal articles, and original articles contributed by the faculty members. Discussion of these articles plus related material presented weekly by a visiting scholar or in a film drives the two weekly discussion sections. Class material is selected to show connections between science and the humanities throughout history. Faculty members recruited from diverse departments participate in an intense preparatory workshop during the summer preceding their teaching. The workshop is known campus wide as an effective faculty development program. Students learn communication and critical thinking skills, tolerance for differences between people, and a sense of the unity of human endeavors.

INFORMED DECISION MAKING: A LABORATORY EXERCISE IN BIOLOGY.

William R. Bowen and Frank A. Romano, III., Department of Biology, Jacksonville State Univ, Jacksonville, AL 36265.

"Informed Decision Making" has become an important consideration in today's society. It is one thing to make a decision but it is another to make an "informed" one. When one addresses controversial biological or environmental issues from a scientific viewpoint, then adds the elements of ethics and morality from a personal viewpoint, even political considerations, making an informed decision is at best very difficult. Just how often do we objectively make an informed decision.. Individual emotions all too often interfere and the element of reasonable compromise is ignored. In freshman biology at Jacksonville State University, we have taken measures to incorporate "informed decision making" learning experiences into the freshman biology laboratory program.. The experiences involve a small group of students (2-4) and these basic steps: determination of an issue (biological or environmental, the latter based on provided data); establishing all possible options for that issue; assigning individual personal values (religious, political, or otherwise); debating the merits of the value-based options; and, as a group, arriving at a consensus group decision with minority opinions possible. The decision must demonstrate a state of being "informed." This learning experience has been both well-received by, and rewarding to, the participating students.

EFFECTS OF NSF INSTRUMENTATION GRANTS ON THE UNDERGRADUATE CHEMISTRY CURRICULUM AT HUNTINGDON COLLEGE.

Massimo D. Bezoari, Dept. of Chemistry and Physics, Huntingdon College, Montgomery, AL 36106.

The Department of Chemistry and Physics at Huntingdon College has been awarded four National Science Foundation grants since 1974 for the acquisition of modern scientific instrumentation. The presentation will focus on results, effects, and methods of implementation for two of the instruments purchased -- an infrared spectrophotometer (DUE-9450945), and a nuclear magnetic resonance spectrometer (DUE-9751534).

The author gratefully acknowledges the support of the National Science Foundation (Grant Nos. DUE-9450945 and DUE-9751534) and Huntingdon College for the acquisition of the instruments.

USING GCMS TO ANALYZE WINE – AN UNDERGRADUATE PROJECT SUITABLE FOR UNDERGRADUATE SCIENCE LABORATORY COURSES. Massimo D. Bezoari, and Carolyn Simmons, Dept. of Chemistry and Physics, Huntingdon College, Montgomery, AL 36106.

Gas chromatography-mass spectrometry (GCMS) is being used in an undergraduate research project to analyze volatile compounds from various wines. The compounds are "injected" into the GCMS system using a purge-and-trap concentrator. The project is teaching the student the scope and limitiations of GCMS analysis and spectral library searching. The authors intend to develop the project into an experiment suitable for undergraduate science laboratory courses.

The authors gratefully acknowledge the support of the National Science Foundation (Grant No. DUE-9951218) and Huntingdon College for the acquisition of the instruments.

BEHAVIORAL AND SOCIAL SCIENCES

AIDS DISCRIMINATION IN HEALTH CARE AND EMPLOYMENT: AN UPDATE. Victor C. Ortloff, Department of Criminal Justice and Social Sciences, Troy State University, Troy, AL 36082.

AIDS rivals cancer as one disease Americans fear most. This fear has led to a variety of prejudicial and discriminatory practices toward its victims. The purpose of the original research by this author in 1992 was to determine if people with HIV/AIDS perceived they were being discriminated against in the areas of health care and employment. Significant evidence in the literature suggested people infected with HIV/AIDS are not only subjected to discriminatory practices, but this discrimination is more pronounced after infection than before infection. It also suggested high risk categories of AIDS victims such as homosexuals, IV drug users, ethnic minorities, and the poor experience more pronounced discrimination. A survey supported by the Alabama Department of Public Health was administered to HIV/AIDS patients in that state. Support for the premise that certain groups of HIV/AIDS patients perceived a greater degree of discrimination in health care and employment after infection appeared weak. Except for minorities, the respondents did not perceive differences in health care discrimination. Perceptions of discrimination in employment, in turn, appeared more pronounced in only those infected through homosexual contact. The current discriminatory template suggests education coupled with legislative efforts by both federal and state officials appears to be further reducing disparaging activities against AIDS victims.

NEITHER VICTIMS NOR VIOLATORS: UNDERSTANDING CHILDREN AND VIOLENCE IN NORTHERN IRELAND. Molly J. Hurley, UAB Honors Program, Univ. of AL. at Birmingham, Birmingham, AL. 35205.

Violent political conflict often attracts the attention of both the popular media and social scientists, especially when children are actively involved in the conflict. In the case of Northern Ireland's civil conflict between Protestants and Catholics, the media's attention was soon turned toward the children. In the late 1960's and early 1970's, the beginning of the most recent and prolonged conflict, some children apparently took part in street rioting as well as other political activities. Journalists took notice of them immediately , and these articles generally glossed over the complexity of the situation. Some social scientists also assumed that these children would either grow up to be terrorists or permanently psychologically scarred victims. However, some social scientists also began to do rigorous research to understand various issues the media overlooked, such as *which* children were actively involved, *why* they were involved, how aware children were of the violence, and how they coped with the violence in their communities. By seeking to understand these issues, social scientists did not come to easy conclusions; however, they *did* reveal several aspects of the situation. They revealed that the children who were actively involved in the conflict made decisions about what actions to take and organized themselves; thus, these children were political activists. Similarly, the children characterized as "victims" often dealt with the conflict in "adult" ways; they coped by using their psychological and/or environmental resources (i.e. family, school, etc.).

HASSLES ON THE INTERNET: REVISION OF THE COMPUTER HASSLES SCALE. Richard A. Hudiburg, University of North Alabama, Florence, AL 35632.

With ever increasing use of the Internet, there may be an increase in stress experienced by computer users. The current research investigated computer "hassles" that users of the Internet might experience. This was accomplished by revising the Computer Hassles Scale (Hudiburg, 1995) to include computer hassles resulting from the use of the Internet. A questionnaire was developed that included computer users' background information, the Computer Hassles Scale-Revised , and self-reported somatic complaints and anxiety reactions. A sample of 119 college student computer users provided complete responses to the questionnaire. A majority of the sample was female (66%), owned a computer (73%), and had taken a computer course (87%). The Computer Hassles Scale-Revised was composed of 63 items: 37 original "hassles" and 26 new internet related "hassles". The "hassles" were ranked ordered in terms of frequency endorsed. The ten most frequently endorsed hassles had themes of concerns about speed of computing and computer information problems. Means were computed for the 37-item hassles score (M= 33.4), the 26-item "new" hassles score (M= 19.8), and the 63-item hassles score (M= 55.9). Pearson correlations were computed between the somatic complaints and anxiety reactions score and the 37-item hassles score (r = .37), the 26-item "new" hassles score (r = .36), and the 63-item hassles score (r = .40). Scales based on the three scores showed high internal consistency reliability alpha coefficients > .90. Based on the data, the Computer Hassles Scale-Revised shows promise as a measure of Internet users' computer stress.

GENDER INEQUALITY IN THE SOUTH CENTRAL U.S.: 1980-1998. Arthur S. Wilke and Gregory S. Kowalski, Dept. of Sociology, Anthropology & Social Work, Auburn Univ., Auburn, AL 36849.

Gender inequality is still an identifiable feature of the labor market. This paper examines gender inequality in the East South Central Region of the United States (Alabama, Kentucky, Mississippi and Tennessee). Using data from the Labor Extracts prepared by the National Bureau of Economic Research (NBER) of the Current Population Survey, four age-sex cohorts of workers were examined: 20-39 year old males and females, 40-59 year old males and females. It was found that while incomes (in constant 1998 dollars) are lower than the nation at large, females in the region are closing the gap with women in the nation at large, while gender inequality in the region is being reduced more dramatically than in the nation. In three of the age-sex cohorts, improved incomes are observed, however for 20 to 39 year old males there is an observed decline.

INFLUENCES OF SEXUAL ABUSE ON FEMALE JUVENILE DELINQUENCY: A RESEARCH PROPOSAL. Elizabeth A. Halbrooks, Dept. of Justice and Public Safety, Auburn University Montgomery, Montgomery, AL 36124.

Influences of sexual abuse on female juvenile delinquency are examined through a correlational research design based on a questionnaire. The testable influences will show that sexually abused females will: Exhibit delinquent behaviors at an earlier age; commit more status and criminal offenses; and be more promiscuous. The questionnaire is given to a sample consisting of female juveniles from the Tennessee Valley Detention Center in Tuscumbia, Alabama, and the High Intensity Training Camp in Gadsden, Alabama. The questionnaires are divided into two groups: A sexually abused group and a non-sexually abused group. The responses of these two groups are compared with statistical analysis. The results should establish a significant relationship between sexual abuse and female juvenile delinquency.

EXPECTATIONS AND OUTCOMES OF POLICE/CITIZEN DYADS. Gerald P. Fisher, Dept. of Criminal Justice, Columbus State University, Columbus, GA. 31907-5645.

Police/citizen interactions play an important role in the public's perception of law enforcement agencies. Citizens act and police react, sometimes with tragic consequences. Is it possible that the potential outcome of police/citizen contacts are determined before there is actual physical or verbal contact? This study looks at literature which associates the use of labeling and expectancy theories with potential outcomes of police/citizen contact.

LEARNING STYLES IN AN ADULT ARENA: AN UPDATE. Saundra L. Casey, Dept. of Speech and Theatre, Troy State Univ., Troy, AL 36082.

Shortages of competitive workers due to educational deficits led to this study of learning styles. Research showed accommodating learning styles improved student achievement. A representative group at Air University's Academic Instructor School was chosen for study. The purpose was to see (a) if student learning styles influenced student academic success as measured by cognitive test scores, (b) which student learning styles were most successful, (c) whether the most successful student learning style was the same as the learning style predominant in the parent organization, and (d) if the instructors' learning styles influenced the students' success on cognitive test scores. Students (149) were given the MBTI. A pretest and a posttest were administered to assess cognitive achievement of course objectives. An Analysis of Partial Variance was computed on posttest scores. A set of posttest residuals was used to measure the significance of the remaining factors. Rank was significant at the .05 level. Lower ranking students evidenced increased posttest scores. Senior ranking students evidenced decreased posttest scores. Civilian students had markedly lower posttest scores than military classmates. Research is needed to discover the source of the influence on senior military and civilian students. Student learning styles had no apparent influence on success. Researchers need to ascertain whether the variety of learning styles strategies built into the course ameliorated the influence of learning styles or the students were so skilled at flexing that influence of learning styles was no longer significant.

FEMINIZATION OF POVERTY IN THE LABOR FORCE: 1980-1998. Arthur S. Wilke and Janice C. Wittekind, Dept. of Sociology, Anthropology & Social Work, Auburn Univ., Auburn, AL 36849.

Gender differences in income and labor force participation are well-documented. Among the factors cited that suppress faster reduction in income inequality are disadvantages experienced by women with respect to changes in marital status and household composition. Taken together, these are used to support the "feminization of poverty" thesis. It is this thesis that is revisited in this paper. This paper examines labor force participation of full-time and part-time workers of two age cohorts, 20 to 39 and 40 to 59, in 1980 and 1998, examining the distribution and (constant dollar) income of age-sex cohorts during these two years. Data are based on the Labor Extracts prepared by the National Bureau of Economic Research (NBER) from the Current Population Survey. Though labor force conditions support the "feminization of poverty" thesis, there is also a companion trend noted, one that may be termed the "masculinization of poverty." The declining proportions of males in full-time positions, the growth in part-time labor by both males and females and the growth in the proportion of males in a "deprived" income subcategory are among the observed trends.

ACADEMIC MISCONDUCT: A STUDY OF DISCARDED CHEAT SHEETS. Robert Pullen, Victor Ortloff, Saundra Casey, Jonathon Payne, Troy State University, Troy, AL 36082.

Cheating is the bane of higher education and strikes at the heart of established values in American culture. Causal factors run the gamut from large classes, impersonal relationships with professors, competition for jobs, gaining higher GPAs in order to enter graduate school, to a culture that appears to accept cheating readily as a normal part of life. While other studies on cheating have examined altitudes, definitions, and justifications, this analysis takes a refreshing digression into the techniques used to cheat, namely the form and format of discarded cheat sheets. The review of actual cheat sheets focused on disciplines represented, type of information recorded, format and construction, method of concealment and the disposal.

HEALTH SCIENCES

CHARACTERISTICS OF DEPRESSED AND NON-DEPRESSED FAMILY CAREGIVERS OF STROKE SURVIVORS. Joan S. Grant, School of Nursing; Timothy R. Elliott, Department of Physical Medicine and Rehabilitation; Alfred Bartolucci, Dept. of Biostatistics; Joyce Newman Giger, School of Nursing; Univ. of Ala. at Birmingham, Birmingham, AL 35294.

Most investigations exploring the impact of sociodemographic, physical, and psychosocial variables on caregiver adjustment have used relatives of individuals experiencing dementia. There is a dearth of studies exploring this type of research in family members of stroke survivors. The present study was conducted to determine the best predictors of caregiver depression at onset of the caregiver role among persons providing care to stroke survivors. The relative contributions of selected stroke survivor and family caregiver demographic variables and caregiver general health, physical functioning, social support, life satisfaction, preparation, and burden in the prediction of depression status were examined using data from 52 primary family caregivers. Level of depression status did not vary as a function of either caregiver race, gender, and education or stroke location and type. Depressed caregivers reported significantly less social support, poorer general health and physical functioning, and less life satisfaction than non-depressed caregivers. Caregiver depression was best predicted by lower life satisfaction, lower physical functioning, and a lack of tangible social support. This study was supported by a grant to the first author from the University of Alabama at Birmingham, School of Nursing and Lister Hill Center for Health Policy.

SLEEP DISTURBANCES, NOCTURIA AND DIABETES IN AFRICAN-AMERICAN COMMUNITY DWELLING OLDER ADULTS. Eileen R. Chasens, DSNc, Mary G. Umlauf, PhD, & Dennis J. Pillion, PhD, University of Alabama at Birmingham

Type 2 diabetes mellitus affects 14 million Americans and is the fourth leading cause of death. The primary aim of this study was to examine the association between sleep-related breathing disturbances, nocturia, and HbA_{1c} levels (glucose control) in older adults living in a large city in the Southeast U.S. A questionnaire solicited symptom reports reflective of obstructive sleep apnea (OSA) symptoms, nocturia, lower urinary tract (LUT) symptoms, and self-rated health (SRH). The sample (n = 114) included a majority of women (58%), African Americans (76%), and obese persons (67% with BMI > 30). The mean age was 64 years (range 50-91), and 36% had poor glucose control (HbA_{1c} > 7.0%). When comparing by race, African American had more OSA symptoms, LUT symptoms, daytime sleepiness, and decreased SRH. When comparing African American subjects (n = 87) by glucose control, subjects with an elevated HbA_{1c} > 7.0% had significantly more OSA symptoms, more nocturia, and decreased SRH. In African American subjects with poor glucose control there were significant correlations ($p < .05$) between OSA symptoms and daytime sleepiness (r = .60) and increased naps (r = .39), nocturia and naps (r= .41), nocturia and decreased sleep quality (r = .57), and nocturia and daytime sleepiness (r =.46). The data supports our hypothesis that nocturia in older adults is frequently caused by OSA. Among older African American Type 2 diabetics, OSA symptoms were associated with nocturia, as well as poor sleep quality increased daytime sleepiness and decreased self-rated health.

DATING VIOLENCE, A YOUNG WOMAN'S PERSPECTIVE. Melinda E Rush, Division of Nursing Graduate Program, MS Univ. for Women, Columbus, MS 39701.

Violence against women has emerged as a major health problem. Four million women a year experience serious assault and one million women a year report nonfatal violence by an intimate. The highest rate of violence against women currently occurs in the 19 to 29 year olds (Bachman & Saltman, 1995). This type of violence is widespread. Dating violence can impact young women's lives resulting in psychological and/or physical consequences, which may have long-term consequences. The purpose of this qualitative study was to explore the meaning of the experience of dating violence or abuse of young women. The research question that directed this study was "What was the lived experience of violence or abuse in a young woman's dating relationship?" A phenomenological approach was used to explore this question. Phenomenology attempts to describe an experience as it is lived without concern for the cause. A feminist perspective informed the study. The population included 18 to 29 year old women attending two Southern universities. The sample consisted of 8 young women who responded to posted advertisements in the newspaper. Individual interviews were done with each young woman asking her what her experience of abuse or violence was in a dating relationship. Giorgi's (1985) systematic phenomenological approach was used for data analysis. The results of this study found that the definition for the lived experience of a violent or abusive dating relationship for a young woman could be stated as multiple losses.

REVIEWING THE WHO: IS THERE A ROLE FOR NURSES AND MIDWIVES IN DECREASING MATERNAL MORTALITY? Wendy K. Cyrus, Primary Care Women's Health Nurse Practitioner Program, University of Alabama at Birmingham School of Nursing, Birmingham, AL 35294. Naeema Al-Gasseer, Chief Nurse Scientist, Headquarters of the World Health Organization, Geneva, Switzerland.

Presently, the maternal mortality rate between developed countries and undeveloped countries is the widest known health disparity in the world. Globally, there are many medical and social conditions that can lead to maternal death. Maternal mortality is not just a health problem; it is a social problem that has ethical and political significance. Nursing and midwifery make up over fifty percent of the health care workforce in any given country. Thus, focusing on nursing and midwifery as an entity would greatly impact health care delivery worldwide. Unmistakably, the same medical and social conditions that lead to ill health in women are the same conditions that affect the roles of nurses and midwives because nurses and midwives are women. If we can strengthen the roles of nurses and midwives through education, practice, and policy initiatives, we may improve maternal health. In the literature use of traditional birth attendants who may be untrained, illiterate, or out of any systematic care, continuously emerges in relation to maternal mortality. Chile is one country in which the full scope of the dynamic roles of well-trained nurses and midwives are established. Maternal mortality ratios have decreased with the development of the professional midwife in Chile. The WHO provides vast information on how to improve nursing and midwifery which in turn would decrease maternal mortality ratios. Currently, the roles of nurses and midwives have great potential but less substantive achievements in decreasing gaps in health care. Perhaps we can all learn from Chile's commitment by using nurses and midwives to decrease maternal mortality. This study was supported in part by NIH/Fogarty International Center-Minority International Research Training Program (MIRT) and the UIC College of Nursing WHO Collaborating Centre.

ATRIAL MYXOMA: THE CLINICAL SPECTRUM. S. Morgan, R.E. Pieroni, The University of Alabama, Internal Medicine, School of Medicine Tuscaloosa Program, Tuscaloosa, AL 35487.

Cardiac tumors are uncommon and the clinical presentations of patients with these tumors are determined primarily by tumor location and size rather than histology. Myxoma a benign globular neoplasm, is the more common coronary intracavity cardiac tumor, and is usually found within the left atrium. As myxomas grow they present a panoply of clinical manifestations including mitral valve obstructions, tumor embolization, and a variety of systematic manifestations such as malaise, fever and arthralgias. We shall present the case of an elderly female with left atrial myxoma underscoring the varied clinical presentations, diagnostic modalities, potential complications, surgery and medical management, and recent findings of possible coronary artery involvement by myxoma.

A SUBMAXIMAL EXERCISE PROTOCOL TO RECONDITION THE PELVIC FLOOR MUSCULATURE. Vicki Y. Johnson, School of Nursing, Univ. of AL-Birmingham, AL 35226

Research has documented the efficacy of maximal voluntary contraction (MVC) exercise for improved pelvic floor muscle (PFM) strength, but the efficacy of submaximal voluntary contraction (SVC) exercise for treatment of genuine stress urinary incontinence (GSUI) has not been described. This study compared training-induced changes in endurance, strength and muscle activity recruitment, and continence control in groups of women with GSUI who exercised the PFM using either near-maximal voluntary contraction (NMVC) or SVC effort. Training-induced changes in PFM response to exercise were tested using a quasi-experimental design. Women (N=32), randomly assigned to either the SVC or NMVC exercise protocol group, were tested pre- and post-training on endurance, muscle contraction strength, muscle activity recruitment, 10-hour weighed pad test for grams of urine loss, and subject-rated severity and frequency of leakage episodes. Repeated measures of specific study variables were retrieved and analyzed from home-training device computer memory and diary records. Increases in muscle contraction strength (t=1.75; p=0.045) and decreases in leakage (t=-1.86; p=0.036) were significant for the SVC group. No significant differences were found between the groups for changes in endurance, muscle activity recruitment, frequency of leakage episodes, or subject-rated severity of urine loss based on a 7-point Likert scale. Study findings suggest that SVC exercise designed with specificity for gain in neuromuscular control may be beneficial for strengthening the PFM and increasing the duration of time that contractions can be sustained to attain and maintain continence in women with GSUI.

PROFOUND HYPOKALEMIA PRESENTING AS GUILLAIN BARRE SYNDROME. A. Shah, R.E. Pieroni, The University of Alabama, Internal Medicine, School of Medicine Tuscaloosa Program, Tuscaloosa, AL 35487.

There is a plethora of causes of low serum hypokalemia which, in tern, can result in a medical variety of clinical manifestation. All organs can be affected by hypokalemia which can result in severe morbidity and even mortality. We shall present the case of a middle-aged female who had developed severe muscular weakness which was originally diagnosed by a neurologist as ascending paralysis (Guillain Barre Syndrome) and worked up with several modalities including lumbar puncture and MRI. As consultants, we noted profound hypokalemia, which we felt, was causing her weakness. Normalization of her potassium resulted notable in clinical improvement. The cause of her hypokalemia was found to be multifactorial and included diarrheic use, chewing tobacco, and pica. We shall describe causes, clinical manifestations and appropriate treatment of hypokalemia with particular emphasis on prevention of the development of this potentially lethal electrolyte disturbance.

EFFECT OF RELAXATION ON POSTOPERATIVE PAIN. Myra A. Smith. University of Alabama School of Nursing, UAB. Birmingham, Alabama, 35294

Findings from studies indicate that many patients report moderate to severe pain after surgery, despite new analgesic administration modalities including patient-controlled analgesia (PCA). Adjunct pain relief measures, such as modified progressive muscle relaxation (PMR) when used with analgesics, may enhance pain relief.

The purpose of this study was to determine the effect of modified PMR plus analgesics administered via PCA on pain intensity, emotional distress, and biophysical measures during initial ambulation to a chair-sitting position of women cancer patients who underwent abdominal surgery. Pain intensity and emotional distress were measured by two 100 millimeter horizontal VAS. Quality of pain was assessed by the Pain Rating Index (PRI) of the McGill Pain Questionnaire. A two group pre-test and post-test experimental design was used.

The sample consisted of 50 women. Findings revealed no significant difference in pain intensity between groups ($t(48)=.235$, $p=.402$). However t-test analysis approached significance for emotional distress ($t(48)=1.657$, $p=.052$). Groups differed in percent of change in systolic ($t(48)=1.828$, $p=.037$) and diastolic blood pressure ($t(48)=1.698$, $p=.048$), but not heart rate ($t(48)=1.675$, $p=.202$). Tender, sore and pulling were most frequently chosen from the PRI.

Because getting out of bed for the first time after surgery is very painful, nurses should assess pain before and after activities, give analgesics, and provide for adjunct pain relief measures. Nurses should also discuss anticipatory pain and pain management goals.

SURVEY OF FEMALE CAMP COUNSELORS: PHYSICAL SELF-PERCEPTION, ADOLESCENT PROFILE AND SELF-EFFICACY. Ellen B. Buckner, University of Alabama School of Nursing, UAB, Birmingham, AL 35294-0113

Physical activity is an essential element of health in children and adolescents. The camp setting was hypothesized to facilitate the development of physical competence and general competence. This study was undertaken to determine if female camp counselors, who typically have participated in camp settings for several years, report higher levels of physical and general competence than general age peers.

Forty (40) female camp counselors, ages 15-20, from 3 camps, participated in this survey. Questionnaires were the Physical Self-Perception Profile by K.R. Fox (1990), the Adolescent Self -Perception Profile by S. Hartner (1988) and the Adolescent Self-Efficacy Scale by J. Connolly (1989). Camp counselors who averaged 16 years of age had attended camp for 1-11 years (mean 6.7 years). Participants scored above published means for undergraduates and high school students in all scales and all subscales. A significant regression equation ($p< .001$) was found linking physical self-perception with adolescent profile to predict self-efficacy (social competence). The camp setting may be crucial link in building fitness and effective physical self-perception and consequent social competence in adolescents.

REFINEMENT OF AN INSTRUMENT FOR ASSESSMENT OF SHIFT REPORT INTERACTION BEHAVIORS. M. Peggy Hays, College of Nursing, Univ. of Ala. in Huntsville, Huntsville, AL. 35899.

The shift report is a forum for nurse leaders to communicate directions to followers. As leader-follower interactions impact staff effectiveness, optimum communication is essential. However, ritualization and negativity have been the focus of research rather than behavioral interactions. The Target Behavior Instrument (TBI) is a method of systematically measuring 10 interaction behaviors between the leader-follower dyad. King's interacting framework and Hersey and Blanchard's situational leadership theory guide the repeated measures single-case design. The initial study involved videotaping 7 subjects in 9 shift reports in a long-term care facility. Findings indicated direction-giving with few questioning and supportive behaviors, individual and dyad stability with employment, environment and education as influencing variables. To refine the instrument, 21 subjects were videotaped in 13 shift reports in a hospital unit. Interactions were measured by the leader-followers' verbal and nonverbal behaviors, their behavior patterns, and specific behavior ratios. The recordings were analyzed in real-time using a test-retest procedure. As a relationship leadership style is associated with units performing well, demonstrating behaviors that enlist accuracy and productivity may be more important than in-depth knowledge. Variables that influence relationships may predict the follower's willingness as well as the unit's cohesiveness, retention, satisfaction and quality outcomes. Use of the shift report as an information and outcome tool would increase individual and unit accountability.

SCOLIOSIS: HEREDITY OR ENVIRONMENT? Tom E. Denton, Dept. of Biology, Auburn University at Montgomery, Montgomery, AL 36117.

The etiology of Adolescent Idiopathic Scoliosis is still unknown and researchers have not reached a consensus as to its mode of inheritance. It has been proposed that genes for AIS may either be dominant, sex influenced, sex-linked, or polygenic. In some cases, reduced penetrance has accompanied the mode of inheritance. Researchers agree that some unknown environmental influence appears to be operative during the adolescent growth spurt between ages 9-14. Some investigators argue that physical forces alone operate during this adolescent period to produce spinal curvatures without gene action. This is a minority viewpoint. Whatever the mechanism, girls are 3:1 more susceptible than boys to have spinal rotations that result in single and double curves. Most curvatures stop in the slight or moderate degree range, but one in every thousand will progress to the severe stage and require corrective surgery. Connective tissue disorders typically are difficult to study and the application of conventional genetics over the last 50 years has not been greatly productive. Hope lies with the Human Genome Project for new ways to derive information that will lead to understanding the cause of this spinal disorder.

SELF-REGULATED LEARNING IN ENTERING BACCALAUREATE NURSING STUDENTS. Kelly A. Goudreau, School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL 35205.

The purpose of this study was to determine the effects of an educational intervention about self-regulated learning strategies on nursing students' self-reported use of self-regulated learning strategies and self-reported outcome measures of course grade and grade point average (GPA). The effectiveness of an educational intervention conducted with baccalaureate nursing student was measured through self-reported use of self-regulated learning strategies by the students, self-reported GPA, and self-reported course exam grades. Self-regulated learning theory provided the conceptual foundation of this study (Schunk & Zimmerman, 1998; Zimmerman, 1989). The use of self-regulated learning strategies by nursing students could potentially increase students' academic performance as measured by course grade and GPA. This study employed a quasi-experimental, nonequivalent control group pretest, posttest design (Polit & Hungler, 1999) with two groups. Levels of self-reported use of self-regulated learning strategies in junior baccalaureate nursing students were assessed in a pre- and post-intervention format using the SFLI (Gordon et al., 1996). Results of the study indicate that an intervention that makes the student aware of various self-regulated learning strategies and their effectiveness increases the self-reported use of those strategies. Self-reported academic outcomes of GPA and course examination grades were not affected significantly during this study. Data collected provided evidence that suggests that nursing students with higher GPAs use more self-regulated learning strategies. These findings are consistent with existing literature on self-regulated learning and suggest the need for long-term interventions with nursing students to instruct and support the use of self-regulated learning strategies in order to improve overall academic outcomes.

GENDER DIFFERENCES IN HEALTH-RELATED QUALITY OF LIFE FOLLOWING BALLOON ANGIOPLASTY. Linda F. Reed, School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL 36294.

One third of female deaths are caused by heart disease. Yet, guidelines for treating cardiovascular disease were established with predominantly male populations and applied to women. The purpose of this study was to determine if there are differences in health-related quality of life (QOL) in men and women at baseline and at 6 months following balloon angioplasty (PTCA). The sample consisted of 177 subjects (30% females). There was a significant (p=.0034) gender difference in age (female, M=64.5; male, M=58.7) In contrast to previous findings, women did not have more cardiac risk factors than men with the exception of higher levels of cholesterol (p=.02). Men had a higher incidence of smoking (p=.045). No significant differences between men and women were found for diabetes, number of vessels diseased, ejection fraction, CHF, or angina. Angina decreased dramatically for both sexes post-PTCA. There were no differences in history of MI, prior/post-PTCA or prior/post-bypass surgery. Women had significantly lower physical functioning scores than men at baseline (p=.015) and at FU (p=.002). Emotional status (p=.013) and social/role function (p=.02) scores at baseline were also significantly lower for women, but they increased to such an extent at follow-up that scores were no longer significantly lower. Health perception was ns by gender as assessed by a single Likert-type item. These outcomes indicated significant differences in perception of QOL by gender at baseline and follow-up after PTCA.

AEROBIC FITNESS PREDICTION METHODS: A REVIEW

Jane L. P. Roy, Judson College, Marion, AL 36756, Mark T. Richardson, Robert Pieroni and Joe F. Smith, The University of Alabama, Tuscaloosa, AL 35487.

For many fitness professionals one of the most important components of health related physical fitness is aerobic fitness. The laboratory test (generally regarded as the best measure of aerobic fitness) involves the direct measurement of maximal oxygen uptake (VO_{2max}, ml/kg/min) during maximal graded treadmill exercise. Laboratory measurement of VO_{2max} is expensive, time consuming, requires highly trained personnel and may not be appropriate for all individuals. Therefore it is not practical in many settings. Consequently, various prediction methods have been developed as a substitute for the direct measurement of VO_{2max}. These can be grouped into four different categories: 1) Non-Exercise - developed using regression equations that predict VO_{2max} using test variables such as age, gender, body composition and physical activity; 2) Maximal Exercise Performance - estimates VO_{2max} based on total duration of exercise during maximal graded exercise; 3) Submaximal Exercise Performance - heart rates obtained at submaximal workloads are used to estimate VO_{2max}; 4) Field Based Tests: field based performance tests of endurance exercise estimate VO_{2max}. Several different ways to estimate VO_{2max} were reviewed with respect to accuracy, individual needs and available resources. It was concluded that most prediction methods provide a reasonable estimate of aerobic fitness ($r = 0.55–0.92$.)

SADDLE EMBOLISM IN A YOUNG DIABETIC.

E Richardson, D Hefelfinger, R Pieroni, C Gresham. The University of Alabama, School of Medicine Tuscaloosa Program, Tuscaloosa, AL 35487.

Pulmonary thromboembolism (PTE) is a distinctly uncommon occurrence in the pediatric population which carries a high rate of morbidity and mortality, and there are known problems with diagnostic methods and treatment options. This case involves a 16-year-old Black male with recently diagnosed diabetes who presented emergently with mental status changes, hypothermia, dehydration, and severe DKA. He was treated with aggressive fluid and electrolyte management, bed rest, and reversal of hyperglycemia and ketoacidosis with IV insulin. On hospital day (HD) 2 he developed fever and work up revealed pneumonia which was treated with IV Abx. On HD 5 he experienced an unexplained syncopal episode with subsequent dyspnea, right shoulder pain, tachypnea, and tachycardia, followed by hypoxia and hypotension. Evaluation included spiral CT which showed massive saddle PTE with marked distal extension bilaterally. Treatment included supportive therapy, heparin, tPA, and long-term warfarin. Further work up revealed negative PVR's and echocardiogram. The source of PTE was not identified. Coagulation factors were normal except for mild protein C deficiency. Risk factor review included dehydration, bed rest, obesity, central venous catheter placement, and possible hypercoaguable state. We shall discuss incidence of PTE in the pediatric population, as well as the need for prompt diagnosis and treatment of this potentially lethal disorder.

PRESSURE ULCERS. R.E. Pieroni, The University of Alabama, Internal Medicine, School of Medicine Tuscaloosa Program, Tuscaloosa, AL 35487.

Pressure ulcers (PU) are lesions caused by unrelieved pressure, which result in damage to underlying tissue. Because PU is for the most part entirely preventable, they are considered an indicator of the quality of nursing and medical care. Patients at risk for PU should be identified early and preventive interventions established expeditiously. The latter includes pressure relief, nutritional support, and moisture as well as incontinence care. Implementation of established guidelines has resulted in significant decreases in PU incidence with corresponding decline in morbidity and mortality. We shall describe risk assessment tools (e.g. the Norton and Braden scales), pressure relieving strategies and posturing devices, appropriate skin care, and methods to assess and provide adequate nutrition and hydration. Simple preventive strategies and their benefits will be discussed.

RAPID DISEASE PROGRESSION FOLLOWING ACUTE INFECTION BY POLYTROPIC HIV-1. Michael L. Sprague, Julie M. Germany-Decker, George M. Shaw, HHMI, University of Alabama at Birmingham, Birmingham, AL 35294.

HIV-1 infection requires the sequential binding of the viral envelope glycoprotein gp120 to the cell surface receptor CD4 and then to a cellular coreceptor belonging to the chemokine family of receptors. Virus isolates recovered from infected individuals in the early stages of disease utilize chemokine receptor CCR5 (R5) exclusively as a coreceptor for cellular infection and do not induce syncitium formation in transformed T-cell lines *in vitro* (non-syncitium inducing or NSI). A critical role of CCR5 in the establishment of infection was strengthened by the observation that individuals defective in CCR5 (*ccr5Δ32*) are conferred natural resistance to infection. Over the course of disease, the coreceptor tropism of the *in vivo* virus population typically expands to include chemokine receptor CXCR4 (X4), which confers a broader cell target range for the virus, and these viruses induce syncitium formation in transformed T-cell lines *in vitro* (syncitium inducing or SI). The broadening of coreceptor tropism to include CXCR4 has been correlated with rapid CD4+ cell decline and poor clinical prognosis, but whether X4 tropism is a cause or an effect of disease progression is not known.

Patient WEAU presented at the University of Alabama at Birmingham's 1917 Clinic with acute HIV-1 infection and experienced an unusually rapid CD4+ cell decline and disease progression to AIDS and death. A unique finding in this case was that both WEAU and his infecting partner, RIER, harbored X4/SI virus near the time of WEAU's seroconversion; this finding suggested that the virus actually transmitted might be X4/SI and not the more typical R5/NSI variety. We molecularly cloned and expressed the WEAU HIV-1 envelope (*env*) gene in pTZ19U and determined its tropism from CXCR4 and CCR5 expressing cells. The viral envelope was found to exhibit tropism for both X4 and R5, a finding not previously reported in the scientific literature. The association in WEAU between primary transmission of X4/SI virus and rapid disease progression supports the notion that viral diversification and expanded coreceptor tropism drive disease progression.

UPDATE ON HEPATITIS C. R Pieroni. The University of Alabama, Internal Medicine, School of Medicine Tuscaloosa Program, Tuscaloosa, AL 35487.

In the U.S. about 4 million individuals are infected by hepatitis C virus (HCV). Over the past 15 years, because of HCV screening, transmission of the virus through blood products has decreased dramatically. This RNA virus can result in persistent infection after parenteral or percutaneous transmission to susceptible patients, over 80% of whom become chronic carriers. Infection occasionally leads to cirrhosis, end-stage liver disease, and hepatocellular carcinoma, especially in alcohol abusers and those with hepatitis B coinfection. Although an effective vaccine does not appear imminent, screening for HCV and molecular assays are helpful in diagnosis, assessment of viral load, and determination of viral serotype. The combination of Interferon alpha and ribavirin have offered limited promise in select patients. Risk factor reduction remains the keystone of HCV prevention. A patient with HCV will be presented with emphasis on pathogenesis, progression, and decision-making concerning possible therapeutic options.

IMPAIRED FASTING GLUCOSE IN A FAMILY PRACTICE CENTER. S. Wedgeworth, R.E. Pieroni, Capstone Medical Center, Univ. of Alabama, Tuscaloosa, AL 35487.

When the American Diabetes Association (ADA) recently (1997) re-defined the criteria for the diagnosis of diabetes, a new category of patients was correspondingly defined. The ADA lowered the fasting glucose level for the diagnosis of diabetes from 140 mg/dL to 126 mg/dL. Those patients with a fasting glucose level between 110 and 125 mg/dL were then defined as being in the category of Impaired Fasting Glucose (IFG). Thus evolved a group of patients who have drawn attention to the consequences of mild elevations of the fasting glucose level. One resulting effect of the new ADA criteria is that they should help identify for intervention individuals at increased risk for coronary heart disease (CHD), who might otherwise have been missed. However, since recommendations regarding the use of LDL-lowering drugs for IFG patients without evidence of CHD are not clearly defined additional clinical information is merited. It was the objective of this investigation to evaluate the correlation between IFG and the risk of CHD. From the patient population of a Family Practice Center, subjects for study were based on the following criteria: they had IFG, with fasting glucose levels between 110-125 mg/dL, thus not diabetic; they were not on any medication which lowers glucose or cholesterol levels, and neither gender nor age were restrictive factors. A total of 65 patients of Capstone Medical Center were evaluated. Along with fasting glucose levels, low-density lipoprotein (LDL) cholesterol levels and total cholesterol levels were determined on the pool of 65 test patients. Results of this pilot study, and implications for future research will be described.

ENGINEERING AND COMPUTER SCIENCE

FROM JAVA A LANGUAGE TO JAVA THE PLATFORM, Raghavan N. Srinivas, Sun Microsystems Mailstop UBUR01-101, 1 Network Drive, Burlington, MA 01803, raghavan@east.sun.com.

Building on the Write Once Run Anywhere philosophy, Java is fast becoming a platform of choice to integrate a myriad of systems, hardware devices and software services. The Java 2 Platform, Enterprise Edition (J2EE) provides a JDBC API for database access, CORBA technology for interaction with existing enterprise resources, and a security model that protects data in Internet applications. Jini Technology creates a Java Technology-centric, homogeneous view of the network, leveraging the ability of Java technology to safely move code dynamically about. Portable data is represented by XML complementing the portable behavior of Java. The above mentioned technologies will be discussed in the context of a service driven economy.

WHAT IS JINI™ AND IS IT THE DISTRIBUTED COMPUTING PANACEA? John Burdett. Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294. burdetjm@cisulab.uab.edu.

Jini™ technology is a distributed computing protocol that permits hardware and software services to interoperate in a spontaneous, resilient, and dynamic environment. Jini™ was designed by Sun Microsystems and extends the ubiquitous programming language of Java™. The inherent ubiquity provides Jini™ with a foundation to allow hardware and software services to interact seamlessly. The Jini™ architecture allows services to cooperate through a Lookup service. The Lookup service provides registration and proxy services to providers and clients. Clients contact the Lookup service to retrieve proxies and use the proxies to interact with services. Providers of services maintain leases with the Lookup service to assure service availability. Using Jini™, a device can join a network and have instantaneous use of all services. The major enigma found in Jini™ is, ironically, its greatest feature. A lack of standardization exists in the implementation of Jini™. Jini™ is in the infancy stages of development and significant ambiguities exist. The innate problem is that similar services could contain unpredictable attributes. Sun Microsystems argues that standards will form among the developing community. Services that deviate from normal practices will not be successful. Lack of standardization promotes cleavages among developers. There exists a proclivity to form alliances that hinder collaboration. Jini™ provides a well-rounded response to many of the historical problems of distributed computing. It abstracts the details of the implementation exclusivity of services. Essentially, the decisions made by Sun Microsystems and the popularity of rival products will determine the future of Jini™.

EXPERIENCES IN BUILDING DISTRIBUTED-OBJECT SYSTEMS. Rajeev R. Raje. Department of Computer and Information Science, Indiana University Purdue University Indianapolis, Indianapolis, IN 46202, rraje@cs.iupui.edu

Distributed computing has become ubiquitous. Although, the idea of distributed computing is fascinating, its software realization is far from trivial. In addition to the in-built complexity of designing large software systems, the paradigm of distribution poses many new challenges such as, heterogeneity, local autonomy, time-sensitivity, concurrency, quality of service, partial failure, privacy and security. In order to successfully build distributed systems, these challenges (or a subset of them) must be met. Experts believe that the distributed object model provides a promising alternative to design complex distributed systems. The object paradigm offers many useful features, such as encapsulation, inheritance, polymorphism, dynamic binding, and reuse. In addition as distributed objects, by their definition, are components they lend themselves to other interesting aspects such as dynamic invocations and compositions. Many distributed models have been proposed by the academia and the industry. RMI (Remote Method Invocation), proposed by Sun, is a natural extension of the basic computational model of Java. It is a language-centric model, which allows the creation of distributed systems in an effortless manner. At Indiana University Purdue University Indianapolis (IUPUI), we have built many distributed systems using RMI. In this presentation, we will outline the challenges in developing such systems and briefly describe a few prototypes built at IUPUI.

MOBILE AGENT COMPUTATION MODEL IN A UBICOMP WORLD. Tao Tao, Department of Computer and Information Science, University of Alabama at Birmingham, AL 35294-1170. Tao@cis.uab.edu.

The Mobile Agent System is widely considered as a rising and promising distributed computing paradigm, however, so far it also meets a lot of challenges, which lie in the lack of applications, security, infrastructure, and standards. On the other hand, "Ubiquitous Computing"(Ubicomp) is becoming the de facto paradigm of dynamic distributed system. First of all, this paper studies the current development of mobile agent computing, briefly introduces "Ubiquitous Computing" and "Tuple Space" technologies. Then it analyzes the factors hampering full acceptance and exploitation of mobile agents, furthermore, describes ongoing research of JatWing – a mobile agent computing framework consisting of two network middlewares: AgentBase and AgentStation, both of which are based on enhanced tuple spaces to address the difficulties confronting mobile agent systems. This JatWing model provides new communication, collaboration, security and fault tolerance schemes to achieve robustness, security and easy interoperation between agents and outside world. Finally, based on this model, we try to merge the mobile agent system into a Ubicomp framework.

COMPONENT ARCHITECTURE FOR E-BUSINESS. Carol Burt, 2AB, 3178 C Highway 31 S, Pelham, AL 35124, cburt@2AB.com

Enterprise Component Architecture for e-Business involves the "big picture" integration of web, enterprise components, and business logic in a service based architecture. The focus will be on making sense of the "alphabet soup" of technologies and understanding where each technology fits in an e-business environment. Technologies to be discussed are: XML, App Servers, Distributed Objects (Enterprise Java Beans and CORBA), and Internet Inter-ORB Protocol.

SECURING COMPONENT ARCHITECTURE, Sam Lumpkin, 2AB, 3178 C Highway 31 S, Pelham, AL 35124, slumpkin@2AB.com

In the current world of component architecture, security has become a problem. Using components from different vendors to build an application provides flexibility in the solution set, but presents problems when trying to secure the application. The answer in this case, as it is in most cases, is a set of interoperable security standards. These standards must allow not only for interoperability between vendor-supplied components, but must also for different security models. This presentation will primarily address the CORBA component architecture and digital certificate/public key authentication, but traditional userid/password schemes will also be discussed. The need for a single, authoritative store for authorization information will also be discussed, centering primarily on the use of a directory that supports LDAP access for this purpose.

MODELING WEB APPLICATION DESIGN WITH UML. Xin Wang, Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294-1170, wangx@cis.uab.edu.

Web applications are becoming more and more popular because of the rapid deployment of the tools and technologies for developing them. By far the focus of web application development has been the tools. Little attention has been paid to the development process. Current development environments make it so easy to produce simple web applications; however, complex web applications are difficult to create. That encourages us to develop and evolve applications with serious analysis and design. Any system with non-trivial complexity needs to be designed and modeled. Modeling is important. It helps us manage complexity. Web applications can get complex rather quickly. A given system can be represented by many different, yet consistent models. Each model has a specific purpose. A primary goal of this presentation is to stress the need for proper modeling and is to focus on design models for web applications with UML, the Unified Modeling Language. This presentation begins with a very brief explanation of web architecture, followed by modeling components of Web Application using UML.

INTERNET-BASED MEDICAL IMAGING APPLICATIONS. Gary York, Chief Technical Officer, Imageon Solutions, Inc., 10 Inverness Parkway, Suite 120, Birmingham, AL 35242, gyork@imageonsolutions.com

Medical imaging is in a unique position to benefit from the power of the Internet. Images captured at an imaging center can be read by a Radiologist in one location, viewed at a hospital for surgical planning, shown to the patient in a doctor's office, and stored persistently in a data center. Medical imagining's requirements include high availability, security, platform independence, high network bandwidth, compression technology, distributed caching, and low cost, long-term storage space. The author will present a distributed, object-oriented architecture that uses standards and off-the-shelf components to make any image available anywhere, anytime, and on any platform.

Hands on Experience using GIS: Documenting the physical growth and Campus History through computer applications. Cheri TaShan Hobson and Constance J. Wilson, Dept. of Community Planning and Urban Studies, Alabama A&M University, Normal, AL 35762 and James Moore, City of Huntsville Planning Department, Huntsville, AL, 35816

Alabama A&M University is growing today and is currently celebrating 125 years of excellence. The campus has grown and changed significantly since it was relocated from Downtown Huntsville to its current site on "Normal's Hill." There are many new buildings but there are also a numerous amount of old buildings that reveal the rich history and the struggles and victories that have shaped the university both physically and culturally. This presentation will graphically display the historic district on the campus of Alabama A&M University. These buildings define the University's past and lay the markers for continuing the strong legacy of education and service. Documenting the history of these buildings is a way of advocating for their preservation and restoration. These buildings offer educational and cultural resources as well as present an image, a campus identity and a cost-benefit opportunity to the campus as it makes plan to accommodate growth. The historic buildings located on Alabama A&M University's campus offers a physical link to the past; provide a sense of national and personal identity and they encourage and fulfill nostalgic instincts for students, alumni, faculty and friends.

A GLIMPSE AT SUBDIVISION SURFACES. X. Wu and J.K. Johnstone, Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294-1170.wux@cis.uab.edu.

Subdivision surfaces are smooth surfaces generated from polyhedral meshes, by the application of repeated subdivisions. They are becoming increasingly popular in computer animation for their simplicity and their potential for hierarchical refinement. The subdivision is defined by a mask, and there are many different choices of mask. We will compare three of the most popular subdivision surfaces, the Catmull-Clark, Loop, and modified Butterfly schemes. We will use qualitative comparisons on several datasets, as well as analyses of the basic differences in approach of the three methods. We will also present some hybrid methods that try to capture the advantages of two methods.

CLIENT/SERVER COMPUTING IN THE JAVA™ 2 ENTERPRISE EDITION ARCHITECTURE. Chunmin Yang, Dept. of Computer and Information Sciences, Univ. of Alabama at Birmingham, Birmingham, AL 35294. (yangc@cis.uab.edu).

Due to the requirement for writing distributed transactional applications, the traditional two-tier models are shifting to multi-tier models, which dramatically simplifies developing, deploying and maintaining applications. Java™ 2 Enterprise Edition (J2EE) is the architecture making it easier to write such applications by separating the low-level details from the business logic. J2EE takes the advantage of J2SE (Java™ 2 Standard Edition) platform, and extends its portability, database access with Enterprise JavaBeans™ components, Java™ Servlets API, JavaServer Pages and XML technology. J2EE has a standard programming model, J2EE Application Programming Model for developing multi-tier, thin-client applications on the platform. JDBC™ is the core technology used in J2EE for providing programmers with a uniform interface to a wide range of relational databases, and providing a common base on which higher-level tools and interfaces can be built. JDBC™ technology is an API, which lets you access virtually any tabular data source from the Java™ programming language. It provides cross-DBMS connectivity to a wide range of SQL databases, and now with the new JDBC™ API, it also provides access to other tabular data sources. By JDBC™ API, the developers could easily connect all corporate data even in a heterogeneous environment. To implement multi-tier systems, the Enterprise beans running on a J2EE server is another key technology, which functions as a middle-tier server in a three-tier client/server system.

SOFTWARE PARALLEL ARCHITECTURE IN OPEN NETWORKING ENVIRONMENT, Yibing Wang, Dept. of Computer and Information Sciences, Univ. of Alabama at Birmingham, Birmingham, AL 35294, wangy@cis.uab.edu

Applications in Internet/Intranet as well as other business networks (referred to as open networking environment, coded as **ONE**) have been evolving from simple static information services to mission critical businesses. The trend posts demand for scalable and efficient hardware and software support, taking into consideration economic reasons. Seeking solution at the service side is critical. Basically, the Client/Server computation model is good for small sized software or good for use at the lower level in a large system. Software with component architecture was designed for sequential execution, even though multi-threading might be used in their components. The present component architecture is not the ideal model for applications in **ONE**, where software has shown some interesting behaviors such as highly repeated computation and concurrency. By adopting the conceptions of parallel virtual machine, intelligent agents, lightweight threads and some considerations for high-performance computing, we may avoid multiple copies of the same computation, reduce context switch, and prevent excessive swapping. Performance can be guaranteed with less computation resource competition. So, besides hardware approaches (such as Beowulf and Cluster computing), software with asynchronous parallel computing architecture is a potential solution to high performance computing in such an environment.

Development of an Orthopoxvirus Genetic and Bioinformatics Database. Bei Hu and Warren T. Jones. Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294. Elliot J. Lefkowitz. Department of Microbiology, , UAB, Birmingham, AL 35294

Bioinformatics is a relatively new research field which takes advantage of the extremely large amounts of biological data being produced today. This data is analysed by sophisticated computer programs in order to identify patterns and/or relationships within or between aspects of a single data set or between data sets. Examples of these include the identification of open reading frames encoding potential genes obtained from raw nucleotide sequence data from the Human Genome Project; and the BLAST program used to compare a nucleotide/amino acid sequence with all sequences in the GenBank database. This presentation will examine the work conducted in our laboratory, where the bioinformatics approach is being used to develop a public database of genetic information concerning orthopoxviruses, a group of viruses which include the human pathogen variola virus.

COLLABORATIVE INTERPRETING SYSTEM - THE DESIGN AND DEVELOPMENT Daisy Y. Wong, Dept. of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294.

The last stage of a Knowledge Discovery (KDD) process, interpretation, is when end users try to make sense out of the patterns reported by data mining mechanisms. Scant research has focussed on interpretation of the mined output by domain experts to support decision-making. Organizations using current KDD tools have found that a single expert is not sufficient to interpret the novel patterns discovered by data mining. This research specifically focuses on the use of computer mediated collaborative technology to support a diverse group of domain experts to interpret output from the data mining stage collectively and on a continuous basis. Such a group process is called Collaborative Interpreting. This paper will discuss the design of the Collaborative Interpreting System (CIS) being developed. The CIS is designed as a World Wide Web (WWW) client-server application that integrates three conceptual subsystems to provide an interactive environment for collaborative interpreting. The CIS software is designed using the object-oriented paradigm. Its development environment is the Java 2 Enterprise Edition (J2EE) platform and the Java programming language. The CIS software components are being implemented as JavaServer Pages (JSP), JavaBeans, Enterprise JavaBeans (EJBs), Dynamic HyperText Markup Language (DHTML), client side Javascripts, and interface to relational databases using Java DataBase Connectivity (JDBC).

This research is supported by a grant from the Alabama Academy of Science, 1998.

ENGINEERING THE VOICE OF THE OBOE WITH ACOUSTICAL PRINCIPLES.
Bryce L. Roberts, Altamont School and Carol A. Leitner, M.D., Dept. of Surgery, University of Alabama at Birmingham, Birmingham Alabama 35233

The oboe is a conical-bore, double reed, and woodwind instrument with a characteristic sound produced by harmonic overtones within a tonal spectrum up to 7,000 Hz. This project applied Bernoulli's Law, Fourier's Series, and Helmholz Principles to analyze regional oboes and their tones. Reeds of three distinct styles (French, American, and German) were constructed and played with instruments of the same three regions. The reed, staple, and resonator of each oboe was expressed in mathematical terms. The sounds produced by these reeds and instruments were expressed in terms of waves and tonal spectrums. The voice of the French oboe, described as penetrating and focused, is characterized by a tonal spectrum with high intensity partials, especially in the upper range. The voice of the American oboe portrayed as round and clear, produces a tonal spectrum in which the first three harmonic overtones and the formant define a Fibonacci spiral. The voice of the German oboe, described as dark and covered, displays a tonal spectrum with high intensity lower partials, but suppressed upper partials. In summary, the invisible voice of each regional oboe was successfully represented in numeric terms, waveforms tonal spectrums, and engineering models. Using this descriptive information, it is possible to recreate the regional oboe sound both actually and virtually.

BEOWULF CLUSTER APPLICATIONS OF JAVA/CORBA.
Liang Guo, Barrett R. Bryant, Robert M. Hyatt, Department of Computer and Information Sciences, University of Alabama at Birmingham, 1300 University Blvd., Birmingham, Alabama 35294-1170, U.S.A. {guo, bryant, hyatt}@cis.uab.edu

Java and CORBA have become standards for network and distributed systems programming over a wide variety of platforms. As a kind of scientific and high performance computing machine, Beowulf is usually built out of commodity hardware components which are connected by a private high speed network, and runs on a free source code and modular design kernel software operating system like FreeBSD and Linux. While Java and CORBA both run on Linux, the underlying operating system of Beowulf clusters, there has not been much work in running Java/CORBA applications on Beowulf. The goal of this project is to develop Java/CORBA technology for a Beowulf cluster of computers. The Beowulf cluster at UAB is a configuration of 15 SGI Indigo-2 machines and 8 Dell PowerEdge 6350 quad-processor 550MHz Xeon machines running Linux. The former 15 machines have 256 MB of RAM each and 4 GB of disk space connected with 10mbit/s Ethernet, while the latter 8 machines have 512 MB of RAM and 27 GB of disk space, with a high-speed cLan GigaNet switch connected among them. Current implemented software includes Tuple Space and PVM. Both of these provide for parallel computing over the distributed network of machines. Applications include parallelizing compilers for object-oriented programming languages, distributed implementation of computer chess, parallel and distributed algorithm performance analysis, debugging and visualization, and implementation of mobile agents.

MULTILEVEL INTERLEAVED SERIAL ORDER COGNITIVE BEHAVIOR.
Steve Donaldson, Department of Computer and Information Science, University of Alabama at Birmingham, 35294

The cognitive behavior of humans is characterized by a powerful ability to follow a particular train of thought or complete a designated activity while performing a variety of other mental operations which either subserve the specified task or are noticeably unrelated to it. Obvious examples include driving while using a cellular telephone, completing an assigned set of tasks (each composed of sub-tasks, and motor sequences), using certain association techniques as an aid to recall, and both reading and writing. The latter examples involve a cognitive hierarchy of thoughts, sentences, words, letters, and strokes which must be processed in an interleaved fashion to accomplish the current objective, either of understanding or transcription. Simulation of these or similar capabilities in systems intended to exhibit artificially intelligent properties may be done via use of various queue, stack, or recursive techniques in the symbolic paradigm, or via named modules for a connectionist approach (eg. word and letter components, etc.). None of these methods is entirely satisfactory for simulation or as an aid in understanding how a generic neural architecture could perform the requisite temporal blending. Consequently, this research explores a general mechanism for interleaving serial order cognitive behavior in the framework of an artificial predictive learning recurrent neural network involving the interaction of recognition, context, and priority modules. The investigation is predicated on the notion that such a task is critical to the development of intelligent autonomous systems capable of exhibiting complex behaviors.

DATA MINING WITH THE INTELLIGENT MINER. Shanyou Ge. Dept. of Computer and Information Science, Univ. of Alabama at Birmingham, AL35294-1170 ge@cis.uab.edu.

Information technology has developed rapidly over the last three decades. Many organizations store increasingly large volumes of data on their computer systems. Useful information might be hidden in the data in the form of implicit patterns and connections that are not easy to discern using conventional data queries and statistical calculations. Data mining is the process of discovering valid, previously unknown, and ultimately comprehensible information from large stores of data. You can use extracted information to form a prediction or classification model, or to identify similarities between database records. The resulting information can help you make more informed decisions. The IBM Intelligent Miner supports a variety of data mining tasks. For example, a retail store might use the Intelligent Miner to identify groups of customers that are most likely to respond to new products and services or to identify new opportunities for cross selling. An insurance company might use the Intelligent Miner with claims to isolate likely fraud indicators. In this talk, an overview of using Intelligent Miner will be presented with an example.

GRAPHICS PROGRAMMING IN JAVA™. Mila Zhang, Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294 zhang4@cis.uab.edu.

Java™ is becoming a popular programming language these days, for its platform independence, enhanced networking features, etc. However, Java is not regarded an ideal Graphics programming language for most graphics people, due to several reasons: first, as an interpreted language, Java is fairly slow and hard to optimize the performance, comparing with the C/C++. And graphics program often needs intensive computing power and memory usage. Second, there are few graphics packages available for Java™ programmers. However, this situation is changing. With the hardware development, the computing power is becoming a less important issue. At the same time, multiple providers are making Java™ a faster language. The graphics packages for Java™ have also appeared. Multiple Graphics packages for Java™ have been released and they could be classified into two major classes: Java3D™ from Sun, and OpenGL-like Java™ implementation from various providers. The strength and weakness of those packages are discussed here, and also compared to their corresponding C/C++ implementations. By exploring these packages, I am arguing that although still not a mature language for graphics programming currently, Java™ may be a powerful and convenient programming tool in the near future.

COM AND CORBA INTEROPERABILITY IN WEB-BASED APPLICATIONS USING SOAP. Matthew C. Mishkoff, Computer and Information Sciences Department, University of Alabama at Birmingham, Birmingham, AL 35294-1170, mishkome@cisulab.uab.edu

COM and CORBA are the two leading component software technologies in the marketplace today. COM is a low-level specification that details how software components written in various programming languages can interoperate on a binary level. Microsoft developed the COM standard and it is the dominant technology used on their family of operating systems. CORBA is a higher-level specification developed by the Object Management Group (OMG) that is dominant on UNIX platforms. Instead of dealing with compatibility on a binary level, the CORBA standard specifies services that all CORBA products must support. Components written to these two standards do not interoperate without some type of bridging technology in place. SOAP, the Simple Object Access Protocol, is one such bridging technology that uses HTTP and XML to facilitate communication between components running anywhere in the Internet. A SOAP client encodes a request to use a method of a component running on a SOAP server using the SOAP XML schema. It then transmits the XML envelope over a standard HTTP request. The SOAP server decodes the envelope, performs the method requested, and sends a XML response back over the HTTP channel.

ANTHROPOLOGY

HUMAN REMAINS FROM A LATE ROMAN/ EARLY BYZANTINE CHURCH AT HACIMUSULAR, TURKEY.

Heath F. Speegle, Jeanette Runquist, Department of Biology, Birmingham-Southern College, Birmingham, AL 35254, Mark B. Garrison, Department of Classical Studies, Trinity Univ., San Antonio, TX 78212, and İlknur Özgen, Department of Archaeology and History of Art, Bilkent Univ., Ankara, Turkey.

During the summer of 1999 a joint excavation between institutions from the Associated Colleges of the South and Bilkent University was eonducted at Hacımusular Höyük in Lyeia in southwestern Turkey. The site is located on the Elmalı plateau in the Taurus mountain range. It is a stratified mound approximately 13m tall and 300m in circumference. Cultures ranging from the Neolithic Era to the Late Roman/Early Byzantine Era are represented. Both Bronze Age and Late Roman/Early Byzantine areas are in the process of being excavated. The human remains recovered are believed to be associated with a Late Roman/Early Byzantine church. At least twenty-five burials were identified and excavated, with the majority found in the area immediately adjacent to a southeast external church wall. The eondition of the remains ranged from extremely fragmentary to fair. This was due both to natural decomposition and post inhumation injuries. The majority of the burials were found in an extended supine position facing an easterly direction. Ages ranging from prepubescent children to the elderly were represented. One pathology was noted in the field. Premortem statures were determined by field measurements of long bones and the average height was found to be 165cm.

THE EVOLUTION OF ADOPTION: A PRELIMINARY H.R.A.F. SURVEY.

Mark Jeffreys, Dept. of English, Univ. of Ala. Birmingham, Birmingham, AL 35294-1260.

Joan B. Silk and Sarah Blaffer Hrdy have offered evolutionary explanations for a variety of human alloparenting behaviors, including fostering and close-kin adoption. There is no tested model, however, to account for nonkin adoption as currently practiced in the West. This paper proceeds from the assumption that if close-kin adoption ean be an evolved capacity, there is no reason to presume nonkin adoption cannot be also. The paper presents results from a recent, simple search of the term "adoption" in the anthropological database of the online Human Relations Area Files (eHRAF). Of the 1,810 matches in 48 cultural files, the majority are found to refer to close-kin adoption. Nonkin adoption is rarely mentioned, is confined to a few cultures in the database, and does not eonform to the contemporary Western pattern. The most parsimonious model for the majority of these adoption references appears to be straightforward kin selection. Nonetheless, four types of nonkin adoption are noted: 1) of children resembling deceased genetic children; 2) of adult captives of war; 3) of entire lineages by larger lineages; 4) of girls to serve as future daughters-in-law. The limitations of the eHRAF data are considered, but the anomalous nature of Western-style nonkin adoption remains striking and seems worthy of further research pursuing a causal explanation for its emergence.

ANALYSIS OF THE SITE STRUCTURE AND FAUNAL REMAINS RECOVERED FROM THE HACIMUSULAR SITE. Kyla E. Tew, Heath F. Speegle, Jeanette Runquist, Department of Biology, Birmingham-Southern College, Birmingham, AL 35254, and Mark B. Garrison, Department of Classical Studies, Trinity Univ., San Antonio, TX 78212.

Hacimusular Höyük is a stratified site located in Lycia in southwestern Turkey. Four distinct excavated areas exist – a Bronze Age area, a Late Roman/Early Byzantine church, a Late Roman/Early Byzantine central building, and a Late Roman/Early Byzantine garbage area. Faunal remains have been recovered from all excavated areas. 6346 bone fragments representing 26 species and 5 classes of vertebrates have been analyzed. These specimens were separated by excavation area and analyzed for NISP, MNI, meat yield rate by species, relative frequency of butchering pattern by species, burning patterns by species, relative frequency of identified vs. unidentified species, relative frequency of NISP to unidentified specimens, butchering patterns by species, burning patterns by species, relative frequency of domesticated vs. undomesticated species, and frequency of body part by species. Thirty percent of the bones from the overall site were from wild species. The Bronze Age area showed a higher percentage (82%) of bones from wild species than did the other areas. Also, the Bronze Age area and the garbage area showed a larger percentage of burned bones than did the other two areas. This suggests that the Bronze Age and garbage areas were possibly cooking/dumping grounds. The greatest species diversity has been found in the garbage area and the least diversity was found in the Bronze Age deposit.

INDIGENOUS AND INTRUSIVE CULTURAL ADAPTATIONS IN SOUTHERN COSTA RICA: CABECARS AND SETTLERS COMPARED. James Sewastynowicz, Dept. of Physical and Earth Sciences, Jacksonville State Univ., Jacksonville, AL 36265

For generations, indigenous Cabecar populations have inhabited the Pacific slopes of the Talamanca mountains in southwestern Costa Rica. In recent decades they have been joined by streams of Spanish-speaking settlers, resulting in large-scale population displacement as some Cabecar communities have been abandoned altogether and the remainder subjected to severe pressures by newcomers. This paper examines the behavioral strategies adopted by settlers in coping with the harsh frontier environment, and their many parallels to indigenous social and economic forms.

Journal of the Alabama Academy of Science, Vol. 71, No. 1-2, January/April 2000.

MINUTES
ALABAMA ACADEMY OF SCIENCE
SPRING EXECUTIVE COMMITTEE MEETING
Samford University
Birmingham, AL

Wednesday, March 29, 2000

A. Dr. Larry Boots, President of the AAS, called the Spring Meeting of the Executive Committee to order at 7:34 p.m. The minutes of the fall meeting were approved as published following a motion and second.

Members Present: Donald W. Salter, Roland Dute, Jim Bradley, William E. Osterhoff, P.C. Sharma, Ellen Buckner, William J. Barrett, Joseph C. Thomas, Mike Moeller, L. S. Hazelgrove, John T. Tarvin, Helen H. Benford, Ken Marion, Jane D. Nall, Gene Omasta, Larry Davenport, Dail Mullins, Anne Cusic, Richard Hudiburg, Walter Wilborn, and Larry Boots.

B. Officers Reports

1. Board of Trustees – Sam Barker presented the following written report:

The minutes of the March 1999 meeting showed 5 persons nominated and elected to the 1999-2002 group. That error has been corrected, and pages 35-36 of your program for this meeting have the proper listing, except that Walter Wilborn's term really extends to 2002, since he was elected in 1999.

A different item appears in the year's report. The year 2000 is the 30th anniversary of my joining the board, with 28 years of service as Chairman. Much as I have enjoyed the privilege of the position, and especially before someone else made the suggestion, I decided not to be available for another term. There are others who deserve this recognition of long sustained interest in the Academy and my establishment of a new record for tenure on the board should not stand any further in their way. I can only hope that those few board members who have not attended an Academy meeting for years will be willing to say no the next time the nominating committee approaches them.

Trustees present were: Sam Barker, William Barrett, Mike Moeller, Gene Omasta, Joseph Thomas, Ken Marion, Walter Wilborn and P.C. Sharma.

2. President – Larry Boots submitted the following written report:

Since nearly all of the work of the Academy is carried out by the very capable officers, committee chairs and section chairs, I have very little to report.

I have, however, been involved in the following:

1) Site visit to Samford University in preparation for the annual meeting.
2) Had contact on several occasions with Dr. Larry Davenport concerning arrangements for the Annual Meeting.
3) Completed the remaining few committee chair positions.
4) Prepared and distributed agenda for the Annual Meeting.
5) Prepared for the Annual Banquet.

3. President-Elect – Richard Hudiburg submitted the following written report:

I have had discussions with the Chair of the Committee on Research, Anne Cusic of UAB, concerning the update of the web site for the various research competitions.

I have had several discussions with the Secretary of AAS about the membership database.

I have had several conversations with the Second Vice-President, Roland Dute, concerning nominations for AAS officers.

I would like to reiterate a goal for the Academy to increase electronic connectivity via e-mail and web pages on the Internet. The membership database shows 310 of AAS members have listed e-mail addresses. At the time of last fall's executive committee meeting 201 of the AAS members listed e-mail addresses.

Dr. Hudiburg proposed a web page for the AAS President. Visiting scientists on a web page was suggested. Possible mentoring opportunities could be listed on an AAS web page.

4. Second Vice President – Roland Dute submitted the following written report:

During the past year I have been active in the following areas: 1) Learning how the Academy functions, 2) consulting with Dr. Bradley as regards increasing submissions to the *AAS Journal*, 3) serving on the Nominating Committee, and 4) working with Dr. Bilbo in an attempt to identify a local arrangements chairperson for the 2001 meeting at Auburn University.

5. Secretary – Priscilla Holland submitted the following written report:

ALABAMA ACADEMY OF SCIENCE
Secretary's Report – March 24, 2000

644—Members
67—New Members 4/1/1999-3/24/2000
48—Lifetime Members
396—Members who have paid dues for current year

SECTION	MEMBERS
Section 1 —Biological Sciences	200
Section 2 —Chemistry	66
Section 3 —Earth Science	28
Section 4 —Geography, Forestry, Conservation and Planning	29
Section 5 —Physics and Mathematics	59
Section 6 —Industry and Economics	30
Section 7 —Science Education	24
Section 8 —Behavioral and Social Science	35
Section 9 —Health Sciences	74
Section 10—Engineering and Computer Science	41
Section 11—Anthropology	11
Section 77—University Libraries	28
Section 88—High School Libraries	2
Undesignated	17

6. Treasurer – Larry Krannich presented the following written report:

The Treasurer's Report consists of copies of the following:

Information for Calendar Year 1999:
ALL ACCOUNT BALANCES as of 12/31/99
ACTIVITIES RELATIVE TO 1999 BUDGET for the period 1/1/99 through 12/31/99
TREASURER'S SUMMARY REPORT BY QUARTER for the period 1/1/99 through 12/31/99
TREASURER'S SUMMARY REPORT BY ACCOUNT for the period 1/1/99 through 12/31/99
Information for Calendar Year 2000
ALL ACCOUNT BALANCES as of 3/14/2000
TREASURER'S SUMMARY REPORT BY QUARTER as of 3/14/00 for the period 1/1/00 through 3/14/00
ACTIVITIES RELATIVE TO 2000 BUDGET for the period 1/1/00 through 3/14/00

Total account balances as of 12/31/99 were $79,300.48. Although the Academy budgeted a deficit of $14,565, the year ended with income exceeding expenditures by $8,016.14. Roughly $15,000 of this difference is due to anticipated but unrealized expenses related to the publishing of the *Journal*. The remainder resulted from less-than-projected income. Half of

the latter was an unanticipated gift from Vulcan Materials. Dues income for 1999 was $1,180 less-than-projected.

For the first quarter of 2000, our dues income is tracking at the rate we observed in 1999. The income to the Gorgas category consists of $1,500 to the Academy for 2000 Scholarship expenses and we have yet to receive the income expected from the Alabama Power Foundation. The *Journal* printing costs are for the Jan-Apr 1999 issue. Based upon projections received from Dr. James Bradley, we can anticipate additional printing costs to be $7,000 - $8,000 for the July and October 1999 issues. This will result in a projected expenditure of approximately $10,000 for printing of the *Journal* during 2000. We do not expect any unforeseen budgetary problems during 2000, except for the deficit increase related to the Journal. **See Attachments 1-7.**

7. Journal Editor – James Bradley submitted the following written report:

Publication Schedule

Publication of the JAAS is behind schedule. This is due to the paucity of appropriate articles being submitted to the journal. The projected publication schedule for the next 3 issues follows.

July 1999 (Vol. 70 No. 3): In Press; to be publ. mid-April, . (Special Issue: Karst in Alabama Symposium)

October 1999 (Vol. 70 No. 4): To be publ. May, 2000. Will include three book reviews.

Jan./April 2000 (Vol. 71 No. 1-2 joint): To be publ. June, 2000.

July 2000 (Vol. 71 No. 3): No papers have been submitted for this issue yet. Please encourage your students and colleagues to submit articles.

I suggest that Symposium organizers henceforth make a concerted effort to encourage the participants to publish their lectures in the JAAS. I would like to devote one issue each year to a collection of Symposium papers from that year's annual meeting.

Future of the *JAAS*

I suggest that we continue publishing hard copies of the *JAAS* for at least two more years or as long as the subsidy from the AU Library is intact. Thereafter, I suggest that we begin having the *JAAS* published electronically by the Auburn University Library. At that time I recommend that we continue publishing the April Abstracts issue as a hard copy (as well as electronically).

Dr. Bradley stated that the average cost of each issue is $3,500 to $4,000 per issue.

8. Counselor to AJAS – B.J. Bateman, chair. Eugene Omasta gave a brief oral report for B. J. Bateman. He reported that the number of participants is down this year due to the spring break scheduling.

9. Science Fair Coordinator - Mary Thomaskutty, Chair – No report

10. Science Olympiad Coordinator - Jane Nall submitted the following written report:

Paid Memberships
75 teams in Division C (grades 9-12)
81 teams in Division B (grades 6-9)
34 teams in Division A2 (grades (3-6)
5 teams in Division A1 (grades K-3)

Participation

75 Division C teams participating at 5 Regionals, 17 advancing to State
Regionals were held at Jacksonville State University, Auburn University, University of Alabama at Tuscaloosa, University of Alabama at Huntsville, and University of South Alabama.

State C hosted by Troy State University, directed by Udo Schnupf, is scheduled for April 15. Winning team advances to National in May in Spokane, Washington.

81 Division B teams participating at 4 Regionals, 17 advancing to State
Regionals were held at Auburn University, University of Alabama at Tuscaloosa, University of Alabama at Huntsville, and University of South Alabama.

State B hosted by the University of Mobile, directed by Jane Nall, is scheduled for April 8. Winner advances to National in May in Spokane, Washington.

61 Division A2 teams participating at Jacksonville State University and Auburn University

5 Division A1 teams participating at Geneva High School

The State Director wishes to express appreciation to the hosts and the Directors for providing hands-on science through Science Olympiad Tournaments to over 3,390 Alabama K-12 students this year. The interest in Science Olympiad throughout Alabama in grades K-12 has increased and the program needs additional institutions to host tournaments.

An Alabama Coaches Clinic for Science Olympiad, possibly held during state meetings of ASTA or AAS, should be investigated and

considered. Supporting this effort would be an opportunity to increase membership of K-12 teachers and participation in the annual meeting.

11. Counselor to AAAS – Katherine Mayne, Chair – No Report

12. Section Officers

I. Biological Sciences – Frank Romano submitted the following written report.

The 1999 meeting at Samford University had 31 oral presentations and 13 posters scheduled for the Biology Section. The oral presentations are grouped into three sessions, Thursday AM, PM, and Friday PM. Friday AM accommodates the Science Education: "The use of problem-based learning in teaching science" Symposium and the Engineering and Computer Science: "Object oriented distributed computing" Symposium.

Dr. Frank Romano is currently serving as chair, and Dr. Donald Salter (U. of West Alabama) is currently serving as the vice chair at the annual meeting of the section.

II. Chemistry – Tracy Hamilton, Chair – No Report

III. Earth Science – Daniel O'Donnell, Chair - No Report

IV. Geography, Forestry, Conservation & Planning – Chukudi Izeogu submitted the following written report:

Section IV of the Alabama Academy of Science has continued to wax strong in the activities of the Academy. During the spring 1999 meeting of the AAS at Athens State University, Athens, Alabama, the section had twelve paper presentations and one poster exhibit. The papers focused on a wide range of subjects including the use and conservation of natural resources, GIS and remote sensing applications, tourism, national and international urban and regional planning, and pop culture. The presentations were made in two sessions followed by the section's general meeting in the afternoon. There were no entries in the research competition this year.

Currently, total Section IV membership stands at twenty-seven. There was a significant increase in student memberships compared to the previous year. The distribution of the membership by place of origin is shown in **Attachment 8**

Section IV faces the challenge of increasing its membership and the number of paper presentations. Every member will be urged to lead out in this effort by recruiting members particularly students in his or her institution. It will also be necessary to send letters to professional colleagues in institutions where we have no members at

present encouraging them to join the Academy and participate at annual meetings by presenting their research papers.

V. Physics and Mathematics – John Tarvin submitted the following written report:

The Physics participation at the AAS Spring Meeting is up this year, with a total of eleven (11) papers and one (1) poster. There are five (5) schools represented in these 12 presentations.

There continues to be strong participation and support in the mathematics area from Samford University; hopefully, this participation can be extended to include other schools. There is also a need for increased student participation. AAS provides an excellent opportunity for student presenters, in that the sessions are small and "non-hostile" for a new presenter. I hope that we can see an increased student presence at the 2001 meeting.

This is my last year as section chair: following this meeting, Dr. Govind Menon of Troy State will assume the chairmanship. We will elect a new vice-chair at our sectional Business Meeting on Thursday, March 30, 2000. I would like to take this opportunity to thank everyone for their support and help during my years of chairmanship – it has been an enjoyable experience.

VI. Industry and Economics – Paulette Alexander, Chair – No Report

VII. Science Education – Helen Benford submitted the following written report:

As of October 1999, Section VII had a membership of 26. Eleven papers are to be presented at the Section VII session of the Annual Meeting. A number of presentations will be made by members whose primary affiliations are with other sections of AAS and this involvement from across the disciplines is welcomed. Several authors were referred to Section VII by section Chairpersons or other officers of AAS. To all of you who encouraged submission of papers, Section VII extends its gratitude. Please continue your support by attending some of the presentations.

At the business meeting last year, Section VII encouraged a science education theme for the academy-wide Symposium at the 2000 meeting. We thank Larry Davenport and his team who planned this year's symposium on "Problem-Based Learning in the Sciences". Section VII members were sent reminders in February that this symposium had been scheduled. Clearly the symposium program will be of interest to AAS members from all sections.

Jane Nall will begin her two-year term as Chair and a new Vice-Chair will be elected at the Section VII session on March 31, 2000.

VIII. Behavioral Sciences – Gerald Fisher, Chair – No Report

It was reported that there are a dozen presentations in Section VIII this year.

IX. Health Sciences – Barbara Wilder, Chair – No Report

X. Engineering and Computer Science – Alan Sprague, Chair – No Report

XI. Anthropology – Curtis Hill, Chair – No Report

13. Executive Officer – Leven Hazelgrove submitted the following written report:

Since the Fall Executive Meeting, October 2, 1999, at Samford University we have been working on the following projects during the last five months:

1. Set up and prepared the Gorgas Scholarship Program for Science Talent Search in cooperation with Westinghouse (Now Intel) Scholarship Science Service, Inc., D.C. for the Samford University, March 31, 2000 meeting with the leadership of Dr. Ellen Buckner, Co-chair, and Dr. Larry Davenport, Local Chair.

2. Prepared for bulk mail 700 printed programs for Samford University meeting for March 29-31, 2000, edited by Dr. William J. Barrett and Dr. Ellen Buckner.

3. Sent development letters to 3 industrial companies and foundations with positive reply from one, Vulcan Chemical of Vulcan Materials, $1,000 for 2000.

4. Sent handwritten notes and brochures to 25 outstanding Scientists and Engineers, Mathematicians and potential members whose "write-up" appeared in local publications.

5. Friday June 25, 10:00 a.m. – Site visit with Dr. Larry Davenport, Professor of Biology and his local committee for the AAS dates: March 29-31, 2000, at Samford University with Drs. Davenport, Buckner, Asouzu, Bush, and Bateman.

6. Prepared 12 abstract forms for the Samford University meeting, March 29-31, 2000 for eleven sections chairs.

7. Your Director studied flora, fauna and pollution in the USA, February 23-24, 2000, with the Alabama Fisheries Association, Joe Wheeler State Park, with Drs. Marion and Angus.

8. Set up the 77th Annual Meeting with the able direction of Dr. Larry Davenport, Professor of Biology, Samford University, Birmingham, AL, March 29-31, 2000.

9. Trying to get the AL Legislature to grant AAS exemption from sales tax! Anyone know anyone? Setting up ASTA Booth, Hoover H. S., October 21-23, 1999.

10. Worked with Dr. Roland Dute and Dr. Bilbo to set up Auburn meeting for March 28-31, 2001!

C. Committee Reports

1. Local Arrangements - Larry Davenport submitted the following written report:

On behalf of the Local Arrangements Committee, I am pleased to invite you to attend the 77th annual meeting of the Academy. This year, the meeting will be held from March 29 to April 1 at Samford University in Birmingham. We have worked hard to plan a program that we hope will interest you, including paper and poster presentations, a social at the McWane Center, two symposia, and an awards banquet. Dr. Ken R. Marion, Professor of Biology at the University of Alabama at Birmingham, will be our banquet speaker; his presentation is entitled "The Art of Survival: Disguise and Deception in Nature".

We hope, also, that you will use this opportunity to become better acquainted with Samford University and the city of Birmingham. Founded as Howard College by Alabama Baptists in Marion in 1841, Samford was later moved to the East Lake area of Birmingham. Then, in the 1950's, the college shifted to its current Georgian Colonial campus in the southern suburb of Homewood. In 1965, its name was changed to reflect university status and to honor the Samford family.

Birmingham, as the largest city in Alabama, truly has much to offer its visitors. Besides the McWane Center, the city houses the Civil Rights Institute, the Birmingham Museum of Art, Sloss Furnaces, the Birmingham Zoo, and the Birmingham Botanical Gardens. If time allows, check out the Southern Museum of Flight or visit nearby parks, such as Oak Mountain and Tannehill. And, of course there's *always* shopping at the Riverchase Galleria and other malls!

If the Local Arrangements Committee can facilitate your attending the annual meeting, or better inform you regarding are accommodations, restaurants or attractions, do not hesitate to contact us. We ver much look forward to your being on our campus, in our community, and in our region of the state.

1. Number of preregistrants is 116
2. 150 places reserved at McWane Center
3. 47 banquet tickets sold; 135 places available

The Local Arrangements Chair reported that since this report was printed the number expected at the banquet has been updated to 125.

2. Finance - Sam Barker submitted the following written report:

Our treasurer has presented his usual colorful Annual Spring Report, together with appropriate remarks on both the 1999 and the current 2000 fiscal years. The 1999 year joined the preceding series during which deficits were forecast but avoided, due to one or more favorable events, either unexpectedly low expenditures or higher income. Our annual Spring Meetings have produced surprising surpluses because of good planning plus a lack of extravagance on the part of Local Arrangements. Printing bills for our *Journal* have been modest, primarily because of delayed publication.

That happy combination is about to end, at least as far as *Journal* expenditures are concerned. In the first quarter of 2000, we have spent over $3,000 for a combined January-April 1999 issue and remaining 1999 costs are expected to be $10,000-$11,000 contrasted to $6,183 left in the 2000 budget. This $4,000 deficit will add to the $8,665 budgeted deficit to put us $12,665 in the hole for 2000. If any Year 2000 *Journal* issues appear during 2000, they will add at least $5,000 each. Considering that net income for the annual meeting is about $5,000, my considered opinion is that our previous good fortune is about to be replaced by a very real (not virtual) excess of expenditure over income probably at about the $9,000 level projected last September.

I hasten to add that I understand our Treasurer's position of not anticipating any budgetary problems because we have a surplus of $87,703.19, alongside which $9,000 is not a problem. Besides, the Academy has not received the promised Gorgas income from the Alabama Power Foundation, nor do we know whether to anticipate any future donations of $1,000 from Vulcan Materials.

Having shown that I can play with optimism let me now return to my preferred pessimism and make a problem where some see no problem. At the next Fall Executive Committee Meeting, traditionally held a calendar quarter short of knowing exactly how large the true deficit will be, a Proposed Budget for 2001 must be adopted, including facing up to the Journal costs being the largest single item. Since I will not be in office at that time, I shall now formally present my successor with the package of interrelated problems,

namely: (a) The Journal of the AAS which is not utilized by Academy membership (dearth of mss.), which (b) costs more and more to print and distribute, (c) a library trend away from hard copy and towards electronic publishing (with as yet uncertain cost-income balance, (d) other Academy activities into which members of the Academy may wish to put more of their energy and money and (e) decreasing income from members' dues. There really are challenges for the Treasurer and the incoming Chairman of the Board, whoever he may be.

By no means do I predict doom – or even the near hysteria of seven years ago when Dr. Krannich became Treasurer in the face of an impending deficit. In fact, we owe great thanks to him for pointing out the variations from quarter to quarter in our fiscal activities and, hence, in our financial appearance. Over the past years, I have reiterated these fluctuations and it is worthwhile to do so again. Our fiscal year is the calendar year. The Annual Meeting comes at the end of the first quarter or early in the second, considerable income and outgo are therefore in the first quarter, since members come through with dues payments not made the previous year (income) and outgo from travel awards, scholarships, and expenses of the meeting occur early. There is an inevitable but variable delay at the institution hosting the annual meeting in balancing its registration receipts and various meeting expenses. There is generally a lull during the summer and early fourth quarters, followed by a late spurt when dues notices are sent out. The time of distress comes during the fourth quarter, at the Fall Executive Committee Meeting, where the Treasurer must present a proposed budget to be adopted for the next year without any inkling as to income or expenditures for the final three months.

There are challenging times ahead and I hope the Academy is prepared to cope.

3. Membership – Anne Cusic submitted the following written report:

Having been chair of this committee for only one month, I do not have a formal report of activities from the past year. The Academy appears to have decreased membership for year 2000 vs. year 1999. Members paying dues for 2000 totaled 396 in comparison to 482 paid members for 1999 meeting. I would like to increase membership in the Academy during the next year. I plan on communicating with the committee members shortly after the annual meeting. Ideas to increase membership could include a contact person at each college or university to provide individual departments with information on the Academy. Also each member could be encouraged to recruit at least one new member during the upcoming year. A third suggestion is to allow members to pay dues for more than one year at a time. Several societies allow this to reduce mailing costs and to have a more stable base of paid members each year.

4. Research - Anne Cusic submitted the following written report:

The web site which contains the application materials related to the Student Research Award Competition, Student Research Grants, and Student Travel Awards was very successful again this year. I received only 13 requests for application materials from the "Call for Paper Titles" mailout. The majority of students went directly to the web site (www2.una.edu/psychology/aaspage.htm).

Eight students applied for Travel Grants. Each of the students was awarded $50. Twenty-two students submitted completed applications for entering the Student Research Awards Competition. Students are competing in six sections of the Academy. Seventeen students are presenting papers and five are competing with poster presentations. Thirteen students submitted proposals for Student Research Grants. One student withdrew his proposal before grants were evaluated. These numbers represent an increase in student participation in both the Research Award and the Research Grant Competitions. There was a slight decrease in requests for travel grants, probably due to the Birmingham location of the meeting.

The Chair or Vice-Chairperson of each section will need to provide the names of the winners of the Student Research Competition to me before the annual meeting banquet scheduled for Friday, March 31.

Due to the success of the web site, I would suggest that the form included in the "Final Announcements for Call for Paper Titles" mailout be modified. Students should be directed to the web site rather than requesting the application forms from the chairperson. The chairperson's name, address, e-mail, and fax should be included if students do not have access to the web site for any questions concerning eligibility.

It would be very helpful if faculty encouraged students to send their applications for competition prior to the last day for submission.

Dr. John Eley of Auburn University will become Chair of the Committee on Research for the next year. I will stay on the committee to assist in the transition. The Research Committee is currently understaffed with only three members. We need two more members before next year's meeting.

5. Long Range Planning – Ken Marion submitted the following written report:

The committee considers a number of items important to the long-term well-being of AAS or at least worthy of discussion and consideration in the near future. Some of these items were generated at the Executive Committee dinner previous to the fall meeting.

1) Continuation of Executive Committee Dinner before the Fall Meeting: Dr. Dan Holliman, who in recent years has graciously hosted the dinner at Birmingham Southern College, will retire in May. The Committee feels that this dinner has been most useful in

identifying and discussing problems and issues facing the Academy. We urge its continuation. If Birmingham Southern would be unable to host it, one of the other Birmingham institutions should be encouraged to do so.

2) Central Location for Annual Meetings: The Committee feels that the Place of Meeting Committee should continue in the future to seek sites centrally located on a fairly regular rotational basis in order to maximize participation at the annual meetings.

3) 2-Year Presidency: This item has been previously presented, but the Committee again sees distinct benefits in a two-year presidency. The experience gained during the first year would be valuable for carrying through initiated programs. Alternately, more defined duties for either the Past-President or President-Elect could result in much of the above benefits.

4) Journal: Because of the prominence of The *Journal* in the AAS budget, continued close monitoring of finances involving The *Journal* is a necessity in the foreseeable future. Although there are some patented negatives, placing The *Journal* on the Internet should at least be explored in some depth as a future possibility.

5) Membership: Although the Committee has no specific recommendations at this time, the Academy should explore possible ways to increase membership in the event they should be deemed expedient in the near future.

6. Auditing – Sr. Academy – Denny Bearce – No Report

7. Auditing – Jr. Academy – Danice Costes – No Report

8. Editorial Board and Associate Journal Editors – Douglas Watson/Larry Wit/Bill Osterhoff submitted the following written report:

I am pleased to announce that the following institutions have supported the *Journal of the Alabama Academy of Science* as benefactors:

Samford University	$500.00
Auburn University at Montgomery	$400.00
University of Alabama/Birmingham	$500.00
Jacksonville State university	$250.00
University of Alabama	$500.00
University of South Alabama	$500.00
University of North Alabama	$100.00
Birmingham Southern	$100.00
University of West Alabama	$300.00
Tuskegee University	$100.00
The University of Montevallo	$250.00

Troy State University	$250.00
TOTAL	$3,750.00

Please note that Auburn University is also listed as a benefaetor of the *Journal* because of its significant annual contribution to our publishing costs.

9. Place and Date of Meeting – Thomas Bilbo submitted the following written report, and he reported that a local arrangement's chairperson is still needed for the Auburn University Annual Meeting in 2001.

Plans for future:

ANNUAL MEETING	LOCATION	LOCAL ARRANGEMENTS CHAIRPERSON
2001 March 28-March 31	Auburn University Auburn, AL 36849	
2002 March 20-March 23	University of West Alabama Station 7 Livingston, AL 35470	Dr. Richard Holland
2003	Jacksonville State University 700 Pelham Road North Jacksonville, AL 36265	Dr. Frank Romano

10. Newsletter – Lynn Stover, Senior Editor – No Report

11. Public Relations – Myra Smith, Chair – No Report

12. Archives – Troy L. Best, Chair – No Report

13. Science and Public Policy – Dail Mullins submitted the following written report:

Committee Members

Dail Mullins – Chair (UAB), Scott Brande (UAB), John Frandsen (AU), Shiva Singh (ASU). E-mail sent to Dr. Shiva Sign was bounced back as undeliverable, so I am uncertain as to whether he is still at Alabama State University.

2000 Alabama Science Course of Study Committee

On March 3, 2000, representatives from eight science-related organizations in the state were invited to appear in Montgomery before the recently assembled Science Course of Study Committee. These included: (1) the Alabama Science Teachers Association; (2) the Alabama Section of the American Association of Physics Teachers; (3) the Alabama Section of the National Association of Biology Teachers; (4) the American Chemistry

Association; (5) the Alabama Mathematics, Science, Technology, and Education Coalition; (6) the Alabama Aerospace Teachers Association; (7) the Environmental Education Association of Alabama; and (8) the Alabama Academy of Science. Each group's representative was allotted 10 minutes to speak to the committee about matters related to the development of the next Course of Study in Science for Alabama public school children. I have included, as an attachment, the comments I made to this committee. **See Attachment 9.**

NAS Booklets – *Teaching About Evolution and the Nature of Science*

Progress continues to be made, albeit slowly, in the distribution of the National Academy of Science booklets, *Teaching About Evolution and the Nature of Science*, to middle school and high school teachers in Alabama. About 50 copies were given to teachers attending the Alabama Science Teachers Association meeting at Hoover High School last fall; Jim Bradley has distributed about a dozen copies to teachers in and around the Auburn area; and I have given copies to about 25 biology teachers who have circulated through my own graduate courses at UAB. At the AAS Executive Committee last fall, it was agreed that the Academy would donate $500 toward the cost of mailing some of the booklets to other teachers. Plans to carry this out are still underway.

Regular "Presence" on the Op-Ed Pages of the *Birmingham News*

Although it may more appropriately fall within the purview of the **Public Relations Committee**, Scott Brande and I have discussed the possibility of trying to establish a permanent presence on the Op-Ed pages of the *Birmingham News*, perhaps as regular contributors to that paper's "Board of Contributors" weekly column. Dr. Brande has several connections at the newspaper from the days he served on the State Textbook Adoption Committee.

14. Gardner Award – Ellen McLaughlin submitted the following report:

Gardner Award Committee Report 2000

1. Requests for nominees for the Gardner Award were made through the Alabama Academy of Science Newsletter.
2. Nominees from previous years were also considered.
3. The Wright A. Gardner Award Committee selected the following nominee for this award.

George F. Crozier, Ph.D.

Dr. Crozier is Executive Director of the Dauphin Island Sea Lab in Alabama and an ardent support of coastal resources preservation and management. He has been a leader in Alabama in education, teaching and research.

4. The other very fine nominees will be held over for consideration next year.
5. Since I have been awarded a sabbatical leave for 2000-2001, I will not be able to serve on this committee next year. My three years have been most enjoyable ones and I have met and learned about many fine people in Alabama science.

15. Carmichael Award – Bill Boardman submitted the following written report:

The committee selected the outstanding paper published in the October 1998 and July 1999 issues of the *Journal of the Alabama Academy of Science* to receive the Emmett B. Carmichael Award. Papers appearing in the October 1999 issue will be included in next year's judging.

The announcement of the recipient(s) of the award and the title of the paper will be made at the presentation at the banquet of the 2000 meeting.

16. Resolutions – No chair

It was announced that there will be three resolutions submitted at this year's banquet.

17. Nominating Committee – Roland Dute submitted the following report:

The nominating committee has commitments/interest from the individuals listed with an asterisk for election to the indicated offices.

President	Dr. Richard Hudiburg (2001)*
First Vice-President (President-elect)	Dr. Roland Dute (2001)*
Second Vice-President	Dr. Steven Watts (2001)*
Secretary	Dr. Dail Mullins (2000-2003)*
Treasurer	Dr. Larry Krannich (1999-2002)
Editor of the AAS Journal	Dr. James Bradley (1999-2000)
State Counselor to the Junior Academy	Dr. B. J. Bateman (1999-2002)
Associate Counselor to Junior Academy	Mrs. Wanda Phillips (1998-2001)
Associate Counselor to the Junior Academy	***
Coordinator of State Science Fairs	Ms Mary Thomaskutty (2000-2003)*
Coordinator of State Science Olympiad	Ms. Jane Nall (1998-2001)

Trustees

William J. Barrett (1998-2001)
Michael Moeller (1998-2001)
Eugene Omasta (1998-2001)
Adriane Ludwick (1998-2001)
Wayne Finley (1999-2002)
Ken Marion (1999-2002)
Walter Wilborn (1999-2002)
Prakash Sharma (1999-2002)
Joseph C. Thomas (2000- 2003)*
James C. Wilkes (2000-2003)*
Dan Holliman (2000-2003)*
B. J. Bateman (2000-2003)*

Section Officers

Biological Sciences	Chair	Frank Romano (2001)
	Vice-Chair	Donald Salter (2002)
Chemistry	Chair	
	Vice-Chair	
Earth Science	Chair	
	Vice-Chair	
Geography, Forestry, Conservation & Planning	Chair	
	Vice-Chair	
Physics and Mathematics	Chair	
	Vice-Chair	
Industry and Economics	Chair	Paulette Alexander (2001)
	Vice-Chair	Eric Rakimian (2001)
Science Education	Chair	
	Vice-Chair	
Behavioral and Social Sciences	Chair	Gerald Fisher
	Vice-Chair	Jerald Burns (2001)
Health Sciences	Chair	
	Vice-Chair	

Engineering and Computer Science	Chair Vice-Chair
Anthropology	Chair Vice-Chair

18. Mason Scholarship – Michael Moeller submitted the following written report:

After considering all the application material for the William H. Mason Scholarship, the Committee has selected Karen Celestine for the $1000 scholarship and she has been notified of this award. Ms. Celestine received a B.S. degree with a major in biology and minor in chemistry from Oakwood College in 1999. She plans to attend Alabama A&M University to earn her "A" level certification in Secondary Science Education.

We had five completed applications for the William H Mason Fellowship this year. The top two applicants as ranked by the Committee are both outstanding and selecting only one person for the scholarship was a difficult task. As it turned out, Ms. Celestine received two first place votes and one second place vote. The other top candidate received one first place vote and two second place votes. In most years, this other person would have been offered the scholarship. Because of this, the Committee respectfully requests that the Academy award two $1000 scholarships this year, with this other person receiving the other award.

The committee chairperson wishes to acknowledge the diligent work by Dr. Malcolm Braid and Dr. Sandy Caudle in reading and rating the applicants.

A motion was made by Dr. Moeller and seconded by Dr. Osterhoff to award two Mason Scholarships this year. The motion passed.

19. Gorgas Scholarship Program – Ellen Buckner submitted the following written report:

The Gorgas program is pleased to report that there were 26 entries from Alabama to the Intel National Science Talent Search. This is an increase from the last two years. Nine schools had entrants and seven of those were included in the final Gorgas selection. Due to an unusually large number of Gorgas finalists choosing to attend out-of-state schools, the designation of Finalist was extended to additional entrants.

The Gorgas Program would like to commend the following teachers who have demonstrated the highest level of commitment to science education by acting as sponsors to students pursuing entrance in the national and Alabama Science Talent Search:

Trudy Anderson
Sophia Clifford
Kim Crockard
Isa Delgado
Barbara Gajewski
Jennifer Gray
Melanie Hanson
DeWayne Key
Cindy Rogers
Louisa Starkey
Cynthia Tillery

We welcome you to view the exhibits from 3:30 to 5:00 p.m. Friday, March 31, in Room 203 Russell Hall.

All reports were accepted as submitted.

D. Old Business - None

E. New Business – None

F. Adjournment – The meeting adjourned at 9:10 p.m.

Respectfully submitted,

Richard Hudiburg, Ph.D
President-Elect

Journal of the Alabama Academy of Science, Vol. 71, No. 1-2, January/April 2000.

REPORT ON THE GORGAS SCHOLARSHIP COMPETITION, 2000

The Gorgas Scholarship Committee announced the ranking of the finalists in the 2000 Alabama Science Talent Search. The Search was held at the meeting of the Alabama Academy of Science at Samford University, Birmingham, Alabama.

The winner of the first-place tuition grant of $3,000 was

Mr. John Lawrence Mays, 1012 Glen View Road, Birmingham, AL 35222.
The Altamont School, Birmingham, AL 35222. Teacher - Sophia Clifford.

First alternate and winner of a $2,000 tuition grant was

Mr. Ross Sullins Scruggs, 4108 Cloverleaf Drive, Birmingham, AL 35243.
Jefferson County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson.

Second alternate and winner of a $1,500 tuition grant was

Ms. Sunena Chhabra, 2400 Burgundy Drive, Birmingham, AL 35244.
Jefferson County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson.

Third alternate and winner of a $1,000 tuition grant was

Mr. Ryan B. Glass, 325 Reddoch Road, Florence, AL 35633.
Bradshaw High School, Florence, AL 35630. Teacher - Cynthia Tillery.

Fourth alternate and winner of a $500 tuition grant was

Ms. Kimberly Elizabeth Landreth, 1017 Eighth Street, Pleasant Grove, AL 35127.
Jefferson County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson.

Fifth alternate was

Mr. Shwetak Naran Patel, 1066 Forestdale Blvd., Birmingham, AL 35214.
Jefferson County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson.

Mr. Parakash Permeshthi Pratibhu, 3237 Wisteria Drive, Brimingham, AL 35216.
Vestavia Hills High School, Vestavia Hills, AL 35216. Teacher - Barbara Gajewski.

Unable to exhibit:

Ms. Jessica Lauren Belue, 103 Victoria Court, Florence, AL 35630
Bradshaw High School, Florence, AL 35630. Teacher - Mrs. Jennifer Gray.

Ms. Kimberly Christine Bartmess, 107 Doubletree Lane, Florence, AL 35634.
Bradshaw High School, Florence, AL 35630. Teacher - Mrs. Jennifer Gray.

Mr. Andrew Samuel Beenken, 3448 Coventry Drive, Birmingham, AL 35243.
Indian Springs School, Indian Springs, AL 35124. Teacher - Isa Delgado.

Mr. John Jarrett Corley, 1505 Oak Cliff Court, Mobile, AL 36609.
W.P. Davidson Sr. High School, Mobile, AL 36609. Teacher - Louisa Starkey.

Ms. Kristen Mary George, 3004 Shandwick Court, Birmingham, AL 35242.
The Altamont School, Birmingham, AL 35222. Teacher - Ms. Kim Crockard.

Mr. Brendan Stephen Lin, 2804 Berkeley Drive, Birmingham, AL 35242.
Jeffersonm County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson.

Ms. Kimberly Diana Magrini, 223 Pawnee Court, Florence, AL 35630.
Bradshaw High School, Florence, AL 36530. Teacher - Mrs. Jennifer Smith-Gray.

Ms. Karen Marie Ruff, 14201 S. Shawdee Road, Huntsville, AL 35803.
Virgil I. Grissom High School, Huntsville, AL 35802. Teacher - Cindy Rodgers.

Mr. Matthew Aaron Taylor, 2170 Estaline Drive, Florence, AL 35630.
Bradshaw High School, Florence, AL 35630. Teachre - Cyntian Tillery.

Ms. Sunday Lynne Vanderver, 1057 House Road, Remlap, AL 35133.
Jefferson County International Baccalaureate School, Irondale, AL 35210.
Teacher - Trudy Anderson

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INSTRUCTIONS TO AUTHORS

Editorial Policy: Publication of the *Journal of the Alabama Academy of Science* is restricted to members. Membership application forms can be obtained from Dr. A. Priscilla Holland, Office of Research, UNA Box 5121, University of North Alabama, Florence, AL 35632-0001. Subject matter should address original research in one of the discipline sections of the Academy: Biological Sciences; Chemistry; Geology: Forestry, Geography, Conservation, and Planning; Physics and Mathematics; Industry and Economics, Science Education; Social Sciences; Health Sciences; Engineering and Computer Science; and Anthropology. Timely review articles of exceptional quality and general readership interest will also be considered. Invited articles dealing with Science Activities in Alabama are occasionally published. Book reviews of Alabama authors are also solicited. Submission of an article for publication in the implies that it has not been published previously and that it not currently being considered for publication elsewhere. Each manuscript will receive at least two simultaneous peer reviews.

Submission: Submit an original and two copies to the editor. Papers which are unreasonably long and verbose, such as uncut theses, will be returned. The title page should contain the author's name, affiliation, and address, including zip code. The editor may request that manuscripts be submitted on a diskette upon their revision or acceptance.

Manuscripts: Consult recent issues of the *Journal* for format. Double-space manuscripts throughout, allowing 1-inch margins. Number all pages. An abstract not exceeding 200 words will be published if the author so desires. Use heading and subdivisions where necessary for clarity. Common headings are: **Introduction** (including literature review), **Procedures** (or **Materials and Methods**), **Results, Discussion,** and **Literature Cited.** Other formats may be more appropriate for certain subject matter areas. Headings should be in all caps and centered on the typed page; sub-headings should be italicized (underlined) and placed at the margin. Avoid excessive use of footnotes. No not use the number 1 for footnotes; begin with 2. Skip additional footnote numbers if one or more authors must have their present address footnoted.

Illustrations: Submit original inked drawings (graphs and diagrams) or clear black and white glossy photographs. Width must not exceed 15 cm and height must not exceed 20 cm. Illustrations not conforming to these dimensions will be returned to the author. Use lettering that will still be legible after a 30% reduction. Designate all illustrations as figures, number consecutively, and cite all figures in the text. Type figure captions on a separate sheet of paper. Send two extra sets of illustrations; xeroxed photographs are satisfactory for review purposes.

Tables: Place each table on a separate sheet. Place a table title directly above each table. Number tables consecutively. Use symbols or letters, not numerals, for table footnotes. Cite all tables in the text.

Literature Cited: Only references cited in the text should be listed under **Literature Cited.** Do not group references according to source (books, periodicals, newspapers, etc.). List in alphabetical order of senior author names. Cite references in the text parenthetically by author-date.